TM 11-5826-219-35/1

TECHNICAL MANUAL

DS, GS, AND DEPOT MAINTENANCE MANUAL,

RECEIVER, RADIO

R-1041B/ARN

This copy is a reprint which includes current pages from Change 1

RTERS, DEPARTMENT OF THE ARMY

JUNE 1967

CAUTION

This equipment is transistorized. Do not make resistance measurements before reading the instructions in paragraph 3–2c(2), 3–3, and 3–9.

CHANGE No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *12 June 1975*

Direct Support, General Support and Depot Maintenance Manual
RECEIVER, RADIO R-1041B/ARN

TM 11-5826-219-35/1, 30 June 1967, is changed as follows:

1. A vertical bar appears opposite changed material.
2. Remove and insert pages as indicated in the page list below:

Remove	Insert
i and ii	i through iii
1-1/(1-2 blank)	1-1/(1-2 blank)
3-5 through 3-8	3-5 through 3-8
6-3 through 6-5	6-3 through 6-5
A-1 and A-2	A-1
Fig. 6-5	Fig. 6-5

3. File this change in the front of the manual for reference purposes.

By Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army
Chief of Staff

Official:

VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-36, (qty rqr block no. 515). Direct and General Support maintenance requirements for R-1041 ( )/ARN.

TECHNICAL MANUAL No. 11-5826-219-35/1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 30 June 1967

DS, GS, AND DEPOT MAINTENANCE MANUAL,

RECEIVER, RADIO R-1041B/ARN

LIST OF ILLUSTRATIONS

*Illustrations are located in rear of Technical Manual.

CHAPTER 1
INTRODUCTION

1-1. Scope

a. This technical manual contains instructions for direct and general support and depot maintenance for Receiver, Radio R-1041B/ARN. It includes instructions appropriate to DS, GS, and depot maintenance for troubleshooting, testing, aligning and repairing the equipment, and replacing maintenance parts. It also lists tools, materials, and test equipment for DS, GS, and depot maintenance. Detailed functions of the equipment are covered in chapter 2.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to Receiver, Radio R-1041B/ARN.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the Receiver, Radio R-1041B/ARN.

NOTE

Applicable forms and records are covered in paragraph 3, TM 11-5826-219.12.

1-3. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports shall be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to Commander US Army Electronics Command, ATTN: AMSEL-MA-Q, Fort Monmouth, N.J. 07703.

CHAPTER 2

FUNCTIONING OF R-1041B/ARN

Section I. GENERAL

2-1. Application

a. Receiver, Radio R-1041B/ARN (receiver) is an airborne marker beacon receiver. It receives and indicates the presence of 75-mga-cycle (mc) amplitude-modulated signals from marker beacon transmitters.

b. The 75-mc marker beacon signal is picked up by the antenna and applied to the receiver where it is amplified and detected. The audio output of the receiver is applied to the headset through the interphone connections of the aircraft; the remote volume control may be used between the receiver and the interphone connections. The receiver output is also applied directly to the switching circuits; the output from the switching circuits controls operation of the remote indicator lamp.

2-2. Block Diagram
(fig. 6-6)

Receiver, Radio R-1041B/ARN is a double-conversation, superheterodyne type. It delivers an audio signal of 400, 1,300, or 3,000 cycles per second (cps) to the interphone system of the aircraft and to the switching circuit in the receiver.

a. Preselector and Double-Conversion Circuits.

(1) Input signals from the antenna are applied to the preselector which passes the 75-mc signal and rejects the image and most adjacent channel frequencies. The preselector increases the selectivity of the receiver and prevents coupling of the 70.8-mc oscillator signal into the antenna.

(2) The output of the preselector is applied to mixer CR1 where it is heterodyned with the output from oscillator Q1. An intermediate frequency (if.) of 4.2 mc (difference frequency) is produced and applied to the 4.2-mc bandpass filter. The 4.2-mc bandpass filter increases the selectivity by further attenuating the adjacent channel frequencies. The output from the 4.2-mc bandpass filter is applied to converter Q2.

(3) The 4.2-mc signal is heterodyned with a 4.72-mc signal from an oscillator located within the converter stage. A second if. signal of 520 kilocycles (kc) (difference frequency) is produced and applied through the 520-kc if. bandpass filter to the 520-kc if. amplifier circuit. The 520-kc if. bandpass filter to the 520-kc if. amplifier circuit. The 520-kc if. bandpass filter provides further adjacent channel frequency elimination so that only the marker beacon signal is coupled to the 520-kc if. amplifiers.

b. If. Amplifier Circuit.

(1) The signal is amplified by three if. amplifier stages to increase the sensitivity of the receiver. The output from third if. amplifier Q5 is applied to detector CR2.

(2) The gain of first and second if. amplifiers Q3 and Q4 is controlled by the delayed automatic gain control (agc) circuit ((3) below). The gain of second if. amplifier Q4 is also controlled by the sensitivity control circuit through the remote sensitivity switch located on the aircraft control panel. The sensitivity control circuit

is preset to provide either a high or low sensitivity as selected by the remote sensitivity switch.

(3) The audio output from detector CR2 (*c*(1) below) is applied to delayed agc rectifier CR3; rectifier CR3 is normally reverse biased to prevent the gain from decreasing when a weak signal is received. When the audio voltage overcomes the reverse bias applied to the diode, rectifier CR3 conducts and applies the rectified voltage to agc amplifier Q6. The direct current (dc) voltage output from agc amplifier Q6 is applied to the first and second if. amplifiers ((2) above).

c. Audio Circuit.

(1) Detector CR2 removes the radiofrequency (rf) component from the signal, leaving only an audiofrequency (af) signal of 400, 1,300, or 3,000 cps; the frequency depends on the type of marker beacon signal being received. The output from detector CR2 is applied to first audio amplifier Q7 and to delayed agc rectifier CR3.

(2) The signal applied to first audio amplifier Q7 is amplified and applied to second audio amplifier Q8. The amplified output from second audio amplifier Q8 is transformer coupled, through output transformer T15, to the audio attenuation circuit and the switching circuit (*d* below).

(3) The audio attenuation circuit is a coarse volume control that provides five different levels of audio output as selected by a five-position switch. The output from the audio attenuation circuit is applied to the headset through the interphone connections of the aircraft. The remote volume control may be used between the receiver and the interphone system to control the audio output within the range selected by the coarse volume control.

d. Switching Circuit.

(1) With no signal applied to the receiver, the normal condition of the switching circuit transistors is Q10, off; Q9, on. In this condition, no output from the switching circuit is applied to the remote indicator lamp and the lamp is not lighted.

(2) When a signal from output transformer T15 is applied to the switching circuit voltage doubler and detector CR4 and CR5, Q9 becomes inoperative. When shaping amplifier Q9 becomes inoperative, light switch Q10 becomes operative and an output current is produced. The output current is applied to the remote indicator lamp; this action causes the lamp to light, indicating reception of a marker beacon signal. The rate of flashing of the indicator lamp indicates the type of marker beacon signal being received.

Section II. CIRCUIT ANALYSIS

2-3. Preselector

(fig. 6-7)

The preselector increases receiver selectivity, which reduces image and most adjacent channel frequency interference. The preselector also prevents th 70.8-mc oscillator signal from coupling into the antenna.

a. The preselector consists of individual filters T1 through T4. Each filter is a paralled-resonant tank circuit tuned to 75 mc; the combination produces a bandpass of 80 kc. The tapped coil of filter T1 offers an impedance of 50 ohms to the antenna for impedance matching. At frequencies other than 75 mc, this impedance changes and a mismatch occurs.

b. Signal input to the preselector is obtained through input jack J1 and coil L3 and applied to the center tap of the coil of filter T1. Coi' L3, in series with the signal input to the receiver, attenuates high-frequency signal inputs, resulting in an increase in the selectivity of the receiver.

c. Coupling between filters in the preselector is provided by capacitors C4, C6, and C8. The output from the preselector is taken from the tap on the coil of filter T4; the coil is tapped to provide a 500-ohm impedance to the cathode circuit of crystal diode mixer CR1.

2-4. Oscillator
(fig. 6-7)

Oscillator Q1, a Hartley-type, crystal-controlled oscillator, generates a frequency of 70.8 mc that is beat against the incoming signal in the mixer stage.

a. Transistor Q1 and its associated components are connected as a modified Hartley-type, crystal-controlled oscillator. Regenerative feedback is obtained from a tap on the tank circuit, consisting of the primary winding of transformer T8 and capacitor C11 and applied to the emitter of the transistor. A fifth overtone crystal, Y1, and capacitor C10 make up the feedback path. The feedback circuit operates as a series-resonant circuit, offering a low impedance at the operating frequency of 70.8 mc. At all other frequencies, the impedance is high. Since feedback is greater at 70.8 mc, the oscillator operates at that frequency. Coil L1 neutralized the capacitance of the crystal holder.

b. Resistors R1 and R2 form a voltage divider between B+ and ground and develop the base voltage for transistor Q1. Capacitor C9 is an rf bypass from the base to ground. The emitter input signal (regenerative feedback) is developed across resistor R3, which also acts as the emitter swamping resistor. Capacitor C12 and the secondary of transformer T8 couple the output of the oscillator to the plate circuit of crystal diode mixer CR1 through the primary winding of transformer T5. Resistor R4 is a voltage-dropping resistor.

2-5. Mixer
(fig. 6-7)

The mixer stage consists of crystal diode CR1, a tapped portion of the coil in filter T4, a tank circuit consisting of the secondary winding of transformer T8 and capacitor C12, and a tank circuit consisting of the primary winding of transformer T5 and capacitor C14. The modulated 75-mc signal from the preselector is developed across the tapped coil in filter T4 and applied to the cathode circuit of the crystal diode. At the same time, the output from the oscillator (70.8 mc) is developed across the secondary winding of transformer T8 and applied to the anode of the crystal diode. The diode mixes both frequencies and, as a result, a difference frequency of 4.2 mc and a sum frequency of 145.8 mc is produced. The primary tank circuit of transformer T5 is tuned to the difference frequency. The 4.2-mc signal in the mixer output is applied to the 4.2-mc bandpass filter.

2-6. Bandpass Filter, 4.2 mc
(fig. 6-7)

The 4.2-mc bandpass filter consists of transformers T5 and T7 and bandpass filter T6. Each is tuned to 4.2 mc by the use of a variable core. The filter provides a bandwidth of 80 kc centered on 4.2 mc. Adjacent channel frequencies are further reduced by the filter and only the marker beacon is coupled to the converter stage. Capacitors C16 and C18 provide coupling between filter sections.

2-7. Converter
(fig. 6-7)

Converter Q2 acts as an oscillator, an amplifier, and a mixer to convert the 4.2-mc modulated signal into a second if. signal of 520 kc.

a. The signal input to the converter is developed across the secondary winding of transformer T7 and applied to the emitter of transistor Q2. The oscillator, which is similar to a Pierce crystal oscillator, generates a frequency of 4.72 mc. The frequency is determined by crystal Y2, which offers a low impedance feedback path from the collector to the base for 4.72 mc and a high impedance for all other frequencies. Capacitor C21 is an rf bypass from base to ground, but, at a frequency of 4.72 mc, it has sufficient impedance to develop feedback voltage to keep the stage oscillating. Capacitor C21 also provides the necessary phase shift so that the feedback voltage is regenerative. Heterodyne action takes place within the transistor, and a second if. signal of 520 kc is produced. The output signal is developed across filter T9 (para 2-8), the collector load for converter Q2.

b. Resistors R7 and R8 form a voltage divider to establish forward bias for transistor Q2. Resistor R6 is the emitter swamping resistor and, in conjunction with capacitor C27, forms a decoupling filter.

2-8. If. Bandpass Filter
(fig. 6-7)

The 520-kc if. bandpass filter consists of individual bandpass filters T9 and T10 and transformer T11. Each is tuned to 520 kc by a variable core. Resistors R9 and R10, in parallel with the coil of filter T9 and the primary of transformer T11, respectively, lower the Q of the tuned circuits to obtain a bandwidth of 80 kc. Coupling between the filters is through capacitors C23 and C25. The output from the 520-kc if. bandpass filter is developed across the secondary of transformer T11 and applied to first if. amplifier Q3.

2-9. If. Amplifiers
(fig. 6-7)

a. First If. Amplifier.

(1) The modulated 520-kc if. signal is applied to the base of first if. amplifier Q3 from the secondary winding of transformer T11. Base bias for first if. amplifier Q3 is developed by the delayed agc circuit. The output from the collector is developed across the primary winding of transformer T12. The inductance of the primary winding together with its stray capacitance forms a tuned circuit, resonant of 520 kc. Resistor R11 broadens the frequency response of the transformer to prevent attenuation of the if. signal when the transformer becomes slightly detuned. Detuning occurs when the base input impedance of second if. amplifier Q4 changes because of agc action; this impedance change is reflected back into the primary winding of transformer T12.

(2) Resistor R13 is the emitter swamping resistor and, in conjunction with capacitor C28, forms a decoupling filter.

b. Second If. Amplifier.

(1) Second if. amplifier Q4 amplifies the signal applied to its base from the secondary of transformer T12. The output signal is developed across the fixed-tuned primary of transformer T13; resistor R19, in parallel with the primary winding, broadens the frequency response of transformer T13. The signal applied to the base of transistor Q4 is controlled by the sensitivity control circuit (para 2-10). Base bias is applied from the delayed agc circuit (para 2-11).

(2) Resistor R18 is the emitter swamping resistor and, in conjunction with capacitor C32, forms a decoupling filter.

c. Third If. Amplifier.

(1) Third if. amplifier Q5 amplifies the signal applied to its base from the secondary of transformer T13. The output signal is developed across the fixed-tune primary of transformer T14 and is transformer coupled to detector CR2, resistor R24, in parallel with the primary winding, broadens the frequency response of transformer T14.

(2) Resistors R20 and R21 form a voltage-divider network to establish forward bias for transistor Q5. Capacitor Q33 is an rf bypass capacitor in the base circuit. Resistor R22 is the emitter swamping resistor and, in conjunction with capacitor C34, forms a decoupling filter.

2-10. Sensitivity Control Circuit
(fig. 6-7)

The sensitivity control circuit enables the pilot to control the sensitivity of the receiver when input signal strengths vary appreciably. The signal developed across the secondary winding of if. transformer T12 is applied across dc blocking capacitor C30, diode CR6. thermistor RT1, resistor R16 and filter capacitor C31. The signal developed across diode CR6 is applied to the base of second if. amplifier transistor Q4 through dc blocking capacitor C30. The resistance of diode CR6

determines the strength of the signal applied to the base of transistor Q4. Diode CR6 acts as a variable resistor with its resistance determined by its conduction rate. Sensitivity control resistors R14 and R17 control the amount of positive voltage applied to the diode anode. With the remote sensitivity switch in the low position, variable resistor R17 is not grounded and variable resistor R14 determines the positive voltage applied to the diode anode. Diode CR6, resistors R16 and R15, variable resistor R14, and thermistor RT1 form a voltage divider network between the +27.5-volt bus and ground. When variable resistor R14 is in the maximum clockwise position, bias is removed from CR6; under this condition, the diode has a high resistance. The input signal is developed across the diode and applied to the base of the transistor. When variable resistor R14 is in the maximum counterclockwise position, maximum bias is applied to diode CR6; under this condition, the diode has a small resistance. Less signal is developed across diode CR6 and applied to the base of the transistor. With variable resistor R17 ungrounded (low sensitivity), variable resistor R14 is adjusted so that an input of 3,000 microvolts to the receiver will light the indicator lamp. With the remote sensitivity switch set to the high position, variable resistor R17 is grounded, causing the resistance at the junction of resistors R6 and R15 to decrease. This lowers the amount of voltage that can be applied to diode CR2, and the diode resistance increases. Under this condition, variable resistor R17 is adjusted so that an input of 1,000 microvolts to the receiver will light the indicator lamp. Capacitor C31 is a bypass capacitor which prevents the if. signal from being fed back into the +27.5 volts bus. Thermistor RT1 is used to compensate for temperature variations.

2-11. Delayed Automatic Gain Control Circuit (fig. 6-7)

The delayed automatic gain control circuit assures that the input to the receiver is strong enough to provide the 12.5-milliwatt output required to operate the indicator lamp before the gain of the first and second if. amplifiers is reduced. The delayed agc circuit consists of delayed agc rectifier CR3 and agc amplifier Q6. The output from agc amplifier Q6 establishes the forward bias for first and second if. amplifiers Q3 and Q4.

a. With no signal or with a weak signal input to the receiver, delayed agc rectifier CR3 is reversed biased. Reverse bias is applied to the cathode of rectifier CR3 through emitter swamping resistor R27 and detector load resistor R31. A positive voltage is applied to the anode of rectifier CR3 from the voltage divider consisting of resistors R28 and R29. The difference between the positive voltages applied to the cathode and anode of rectifier CR3 is such that the diode is reverse biased. With diode CR3 reverse biased, the voltage applied to the base of agc amplifier Q6 is set by voltage-divider resistors R28 and R29 and forward biases transistor Q6. Agc amplifier Q6, a dc amplifier, is conducting and develops a positive voltage (with respect to ground) across collector load resistor R26. Capacitor C29 charges through resistor R26. The voltage present across capacitor C29 is applied to first and second if. amplifiers Q3 and Q4 to provide forward bias for the transistors.

b. When the signal voltage developed across detector load resistor R31 (para 2-12) overcomes the positive voltage applied to the cathode of delayed agc rectifier CR3, the diode conducts. Current flow from diode CR3 through resistor R28 increases the forward bias on agc amplifier Q6 resultant increases of collector current causes the voltage dropped across collector load resistor R26 to increase. This action results in a more positive voltage being applied to the bases of first and second if. amplifiers Q3 and Q4, decreasing the forward bias applied to transistors Q3 and Q4; the transistors conduct less and cause a decrease in the receiver gain. The time constant of resistor R25 and capacitor C29 is such that the capacitor will not respond to instantaneous changes in the voltage dropped across resistor R26. Capacitor R27 is an rf bypass capacitor to prevent interaction between first and second if. amplifiers Q3 and Q4. Resistor R30 is a current-limiting resistor for diode CR3. Capacitor C36, in conjunction with resistor R29,

filters the rectified output of diode CR3. Capacitor C35 and emitter swamping resistor R27 form a decoupling filter.

2-12. Detector
(fig. 6-7)

The detector rectifiers and filters the if. signal in its output. The detector circuit consists of diode CR2, resistor R31, and capacitor C37. When a modulated if. signal is applied to the detector circuit from the secondary to transformer T14, diode CR2 rectifies the signal. Resistor R31 and capacitor C37 filter the rectified if. signal and produce the audio output. The audio signal developed across detector load resistor R31 is coupled to first audio amplifier Q7 through capacitor C38 and applied directly to the delayed agc circuit (para 2-11).

2-13. Audio Amplifiers
(fig. 6-7)

a. First Audio Amplifier. The audio output signal from detector load resistor R31 is coupled to the base of first audio amplifier Q7 through capacitor C38. The audio signal is amplified by transistor Q7, and the output is developed across collector load resistor R35 and applied to the base of second audio amplifier Q8 (*b* below). Resistors R33 and R34 form a voltage divider to establish forward bias for transistor Q7. Resistor R37 is the emitter swamping resistor and, in conjunction with capacitor C40, forms a decoupling filter to prevent degeneration.

b. Second Audio Amplifier. The output signal from first audio amplifier Q7 is coupled through capacitor C41 and applied to the base of second audio amplifier Q8. A negative feedback developed by unbypassed emitter resistor R40 aids in preventing the transistor from being overdriven during large signal inputs. Second audio amplifier Q8 amplifies the signal applied to it and produces enough current to drive output transformer T15 (para 2-14). Resistors R39 and R38 form a voltage-divider network to establish forward bias for transistor Q8. Resistor R41 is the emitter swamping resistor and, in conjunction with capacitor C42, forms a decoupling filter. Capacitor C43 is an rf bypass capacitor to eliminate transients which may be present on the output signal.

2-14. Audio Output Circuit
(fig. 6-7)

The audio output from second audio amplifier Q8 is coupled through transformer T15 and applied to the coarse volume control (audio attenuation switch) circuit (*a* below). Transformer T15 has two secondary windings, one for each output.

a. The coarse volume control provides five audio levels in its output. The circuit consists of audio attenuation switch S1 and resistors R51 through R58. The resistors form a voltage divider between terminal 6 of transformer T15 and ground for positions 1 through 4 of switch S1. Resistors R55 through R58 are connected in series between transformer T15 and switch S1. One of the remaining resistors (R51 through R54) is also connected in the series-resistance circuit by switch S1; the audio output is connected in parallel with one of these resistors. Audio attenuation switch S1 determines the amount of resistance that will be used in the circuit. As switch S1 is changed from position 1 through position 4, less resistance is placed in series while a larger resistance is connected in parallel with the output. In position 5 of switch S1, no resistance is used. This will produce five audio output levels with minimum volume being obtained when switch S1 is in position 1 and maximum volume when switch S1 is in position 5. The output is taken from the wiper contact of switch S1 and applied to terminal C of connector J2.

b. The output from secondary winding 4-3 of transformer T15 is applied to the switching circuit (para 2-15) through capacitor C44.

2-15. Switching Circuit
(fig. 6-7)

The switching circuit controls operation of the remote indicator lamp on the aircraft instrument panel. With no signal applied to the switching circuit, light switch Q10 has no current output and the indicator lamp is not lighted (*a* below). When a signal is received, light switch Q10 provides the current output to light the indicator lamp (*b* below).

a. With no input signal, the normal condition of the switching circuit is light driver Q9, on (conducting); light switch Q10 off (not conducting). The quiescent condition of the switching circuit is set up by voltage divider R42 and R43. The voltage at the junction of R42 and R43 is applied to the base of transistor Q9 to forward bias the transistor, causing it to conduct heavily. The voltage divider of R46, R47, and R49 with the conduction of transistor Q9 provides reverse bias for transistor Q10. Diode CR8 in the emitter circuit of transistor Q10 keeps the emitter less positive than the base.

b. When a signal is received, the output from terminal 3 of transformer T15 is coupled through C44 to the junction of CR4 and CR5. Diodes CR4 and CR5, bypass capacitor C45, filter capacitor C46, and filter load resistor R44 form a voltage doubler and detector stage. The voltage developed by the voltage doubler is applied to the base of transistor Q9 through R45 a current-limiting resistor, thus reverse biasing transistor Q9. With transistor Q9 cut off, the reverse bias on light switch Q10 is removed. Light switch Q10 will now conduct to provide the output current to light the remote indicator lamp. The output current path is from the remote indicator lamp, through terminal J of connector J2, to the collector of transistor Q10.

2-16. Power Input Circuit
(fig. 6-7)

a. Direct Current (dc) power (27.5 volts) is supplied to the receiver from the power source through pin E of connector J2. The input voltage is routed through diode CR7 and a pi-type filter, consisting of coil L2 and capacitors C47 and C53 to various circuits in the receiver. The pi-type filter prevents noise from the power circuits.

d. Dc power to the switching circuit is applied through diode CR7.

c. Diode CR7 prevents damage to the receiver if a voltage of opposite polarity is connected to the receiver. Diode CR7 also provides protection if an overload occurs. An rf filter assembly consisting of feedthrough capacitors C48 through C51 and C47 prevents rf interference generated within the R-1041B/ARN from entering the power supply.

CHAPTER 3

TROUBLESHOOTING

Section I. GENERAL TROUBLESHOOTING TECHNIQUES

3-1. General Instructions

The direct and general support and depot maintenance procedures given in this manual supplement the procedures given in the operator and organizational maintenance manual. The systematic troubleshooting procedure, which begins with the operational and localization checks that can be performed at an organizational category, is carried to a higher catageory in this manual. Paragraphs 3-4 through 3-9 describe intraunit (within the unit) direct and general support maintenance localizing and isolating procedures.

3-2. Organization of Troubleshooting Procedures

a. General. The first step in servicing a defective receiver is to localize the fault. Localization means tracing the fault to a major circuit or stage responsible for the abnormal condition. The second step is to isolate the fault. Isolation means tracing the fault to a defective part responsible for the abnormal condition. Some faults, such as burned-out resistors, arcing, and shorted transformers, can often be isolated by sight, smell, and hearing. The majority of faults, however, must be isolated by checking voltages and resistances.

b. Localization. The tests listed below will aid in localizing trouble to a major circuit of stage in the receiver.

(1) *Visual inspection.* The purpose of visual inspection is to locate faults without testing or measuring circuits. Visual signs should be observed and an attempt made to localize the fault to a major circuit, stage, or part.

(2) *Troubleshooting chart.* The symptoms listed in the troubleshooting chart (para 3-5) provide additional information that will aid in localizing trouble to a major section of the receiver.

(3) *Signal substitution.* Signal substitution procedures (para 3-6) enable the repairman to localize a trouble quickly to a group of stages or to an individual stage. An audio oscillator, signal generator, frequency mter, and audio level meter are units of test equipment (para 3-3) that may be used in signal substitution procedures. Observe the cautions in paragraph 3-3 and follow the signal substitution procedures (para 3-6) closely so that damage to transistors may be avoided.

c. Isolation. After the trouble has been localized (*b* above), the data given in (1) through (4) below will aid in isolating the trouble to a defective circuit element.

(1) *Voltage measurements.* The R-1041B/ARN is transistorized. When measuring voltages, use tape or sleeving (spaghetti) to insulate the entire test prod, except for the extreme tip. A momentary short circuit can ruin the transistor. Use an electronic multimeter vacuum-tube voltmeter (vtvm) for all voltage and resistance measurements.

(2) *Resistance measurements.* Make resistance measurements in this equipment only as directed on voltage and resistance diagrams or charts (para

3-9). Use the ohmmeter range specified on these diagrams or charts; otherwise the indications obtained will be inaccurate.

Caution: **Before using any ohmmeter to test transistors or transistor circuits, check the open-circuit voltage across the ohmmeter test leads. Do not use the ohmmeter if the open-circuit voltage exceeds 1.5 volts; also, since the RX1 range normally connects the ohmmeter internal battery directly across the test leads, the comparatively high current (50 milliamperes (ma) or more) may damage the transistor under test. Generally the RX1 range of any ohmmeter should not be used when testing low-power transistors.**

(3) *Intermittent troubles.* In all of the tests, the possibility of intermittent troubles should not be overlooked. If present, this type of trouble often may be made to appear by tapping or jarring the equipment. Make a visual inspection of the wiring and connections in the receiver. Minute cracks in printed circuit boards can cause intermittent operation. A magnifying glass is often helpful in locating defects in printed boards. Continuity measurements of printed conductors may be made by using the same technique ordinarily used on hidden conventional wiring; observe ohmmeter precautions discussed in (2) above.

(4) *Resistor and capacitor color code diagrams.* Resistor and capacitor color code diagrams (figs. 6-12 and 6-13) are provided to aid maintenance personnel in determing the value, voltage rating, and tolerance of capacitors and resistors.

3-3. Test Equipment and Tools Required

The following chart lists test equipment and tools required for troubleshooting the R-1041B/ARN.

Cautions:

1. This equipment contains transistor circuits. If any test equipment item does not have an isolation transformer in its power supply circuit, connect a suitable transformer (FSN 5950-356-1779) in the power input circuit.

2. Never connect test equipment (other than multimeters and vtvm's) outputs directly to a transistor circuit; use a coupling capacitor.

3. Make test equipment connections carefully so that shorts will not be caused by exposed test equipment connectors. Tape or sleeve (spaghetti) test prods or clips as necessary to leave as little exposed as needed to make contact to the circuit under test.

4. The regulated dc power supply used to supply power to the receiver must have good voltage regulation and low alternating-current (ac) ripple. Good regulation is important because the output voltage of a dc power supply which has poor regulation may exceed the maximum voltage rating of the transistors in the equipment being tested. A dc power supply that has poor ac filtering will create a false indication of poor filtering in the equipment being tested.

5. The transistorized equipment must be turned off, or the regulated dc power supply voltage set to zero, before switching the dc power supply on or off. The transient voltages created by switching the dc power supply on and off may exceed the punch-through rating of the transistors. Make sure that a normal load (such as a headset) is connected to the transistorized equipment before applying power.

Test equipment	Common name
Adapter UG-274A/U	Adapter tee.
Attenuator, Boonton 505A	6-db pad.
Audio Oscillator TS-382 (*)/U[a].	Audio oscillator.
Frequency Meter AN/USM-26	Frequency meter.
Generator, Signal AN/USM-44(*)[b].	Signal generator.
Output Meter TS-585(*)/U[c]	Output meter.
Multimeter ME-26(*)U[d]	Vtvm.
Multimeter TS-352(*)/U[e]	Multimeter.
Power Supply PP-1104 (*)/G (or equivalent)[f].	Power supply.
Radio Frequency Signal Generator Set AN/URM-25(*)[g].	Rf signal generator.

Test equipment	Common name
Test Set, Radio AN/ARM-52	Test set.
Test Set, Transistor TS-1836/U	Transistor tester.
Tool Kit, Radio and Radar Repairman TK-87/U.	
Tool Kit, Radio and Radar Repairman TK-88/U.	

[a]Indicates TS-382B/U, TS-382D/U, TS-382E/U, and TS-382F/U.
[b]Indicates AN/USM-44 and AN/USM-44A.
[c]Indicates TS-585A/U, TS-585C/U, and TS-585D/U.
[d]Indicates ME-26A/U and ME-26B/U.
[e]Indicates TS-352/U, TS-352A/U, and TS-352B/U.
[f]Indicates PP-1104A/G and PP-1104B/G.
[g]Indicates AN/URM-25A, AN/URM-25B, AN/URM-25C, AN/URM-25D.

Section II. TROUBLESHOOTING RECEIVER, RADIO R-1041B/ARN

Caution: **Do not attempt removal or replacement of parts before reading the instructions in paragraphs 4-1 and 4-2.**

3-4. Bench Test Procedures
(fig. 3-1)

Bench test of the receiver is performed with the receiver connected to the test set. The test set simulates the aircraft installation and contains the indicator and controls which are normally part of the aircraft. The test set supplies and controls input power to the receiver. The cable required for connecting the receiver to the test set is supplied with the test set. Perform the bench test given below until an abnormal indication is obtained and then refer to the troubleshooting chart (para 3-5*d*) or the signal substitution procedures (para 3-6) to further localize the trouble.

a. Interconnect the receiver, power supply, and test equipment as shown in figure 3-1.

b. Set the test set controls as follows:

Control	Position
POWER switch	OFF.
KEYER switch	OFF.
SENSITIVITY switch	HI.
SYSTEMS switch	1 LIGHT.
METER OUTPUT-PHONES OUTPUT switch.	METER OUTPUT.
Meter-adjusting screw	Zero indication on meter.

c. Adjust the output meter for an impedance of 150 ohms and set it on its lowest range.

d. Turn on the power supply and adjust it for 27.5 volts. Turn on the test set, signal generator, and audio oscillator. Allow a 15-minute warmup period before proceeding.

e. Set the receiver volume control to position 5.

f. Adjust the signal generator for an output frequency of 75 mc.

g. Set the audio oscillator for a frequency of 1,300 cps. Adjust the audio oscillator output power to modulate the signal generator 90 percent.

h. Increase the power output of the signal generator until the 400 CPS indicator on the test set lights. The output of the signal generator should be approximately 1,000 microvolts, and the output meter should indicate at least 5 milliwatts of audio power when the indicator lights. Record the values indicated by the signal generator and the output meter.

i. Vary the audio oscillator frequency from 380 to 3,150 cps while observing the output meter. The audio output should not vary more than 3 decibels (db) from the reference obtained at 1,300 cps (*h* above). Reset the audio oscillator to 1,300 cps.

j. Set the receiver volume control one step counterclockwise. The output meter indication should be 3.5 db to 6.5 db below the value recorded in *h* above. Each additional step counterclockwise on the receiver volume control should reduce the power output by 3.5 db to 6.5 db below the value indicated for the previous control position.

k. Return the receiver volume control fully clockwise.

l. Place the SENSITIVITY control on the test set to the LO position.

m. Adjust the power output of the signal generator until the 400 CPS indicator on the test set lights. The output of the signal generator should be approximately 3,000 microvolts and the output meter should indicate at least 5 milliwatts of audio power when the indicator lights. Record the values indicated on the signal generator and the output meter.

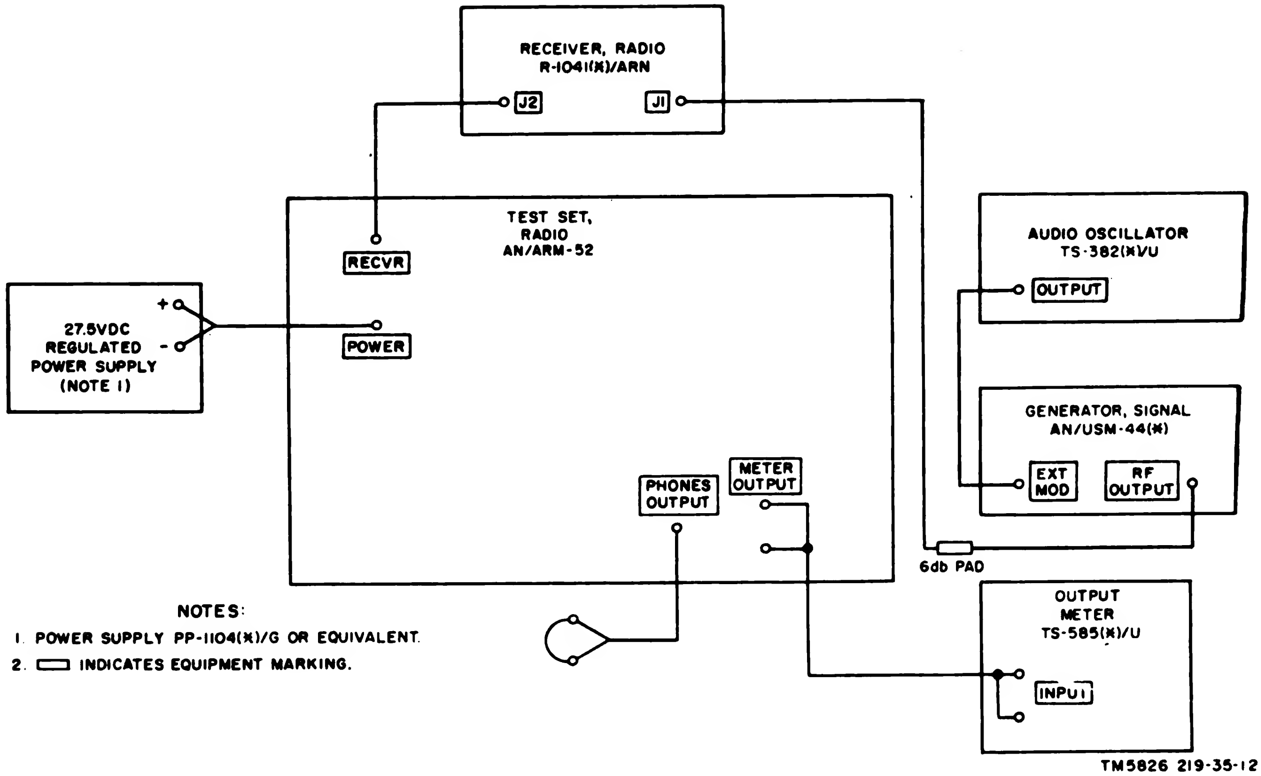


Figure 3-1. Bench test setup.

3-5. Localizing Troubles

a. General. Procedures are outlined in the troubleshooting chart (*d* below) for localizing troubles to a major section of the receiver. Depending on the nature of the operational symptoms, one or more of the localizing procedures will be necessary. When use of the procedures results in localization of trouble to a particular stage, use the techniques outlined in paragraph 3-7 to isolate the trouble to a particular part. Parts location for the R-1041B/ARN is shown in figures 3-2 and 3-3.

b. Use of Chart. The troubleshooting chart supplements the operational checks detailed in the bench test procedure (para 3-4). If previous operational checks have resulted in reference to a particular item of this chart, go directly to the referenced item. If no operational symptoms are known, perform the bench test given in paragraph 3-4.

c. Condition for Tests. All checks outlined in the troubleshooting chart are to be conducted with the receiver connected to the bench test setup shown in figure 3-1.

d. Troubleshooting Chart.

Note. Bench test the receiver (para 3-4) unless trouble has already been localized.

Item	Indication	Probable trouble	Procedure
1	No output from receiver; meter on test set does not show any current indication.	Open diode CR-7	Replace diode; if replacement diode opens, check for shorted capacitor C53, C52, also check L2 and T15 for shorts.
		Open coil L2	Check resistance of coil (para 3-9).

d. Troubleshooting Chart – Continued.

Item	Indication	Probable trouble	Procedure
		Defective power connector J2	Check pins A and E of connector J2; check wiring between connector J2 and printed circuit board.
2	No output from receiver; meter on test set has a current indication.	Defective rf, if., or audio stage.	Perform signal substitution procedure (para 3-6) to localize trouble to a section or to an individual stage; then perform isolating procedures (para 3-7) to locate defective part.
3	No output indication on output meter or headset for any position of receiver volume control; 400 CPS indicator on test set lights.	Defective transformer T15	Check resistance of secondary winding 5-6 (para 3-9).
		Defective switch S1	Check switch; replace if defective.
		Shorted capacitor C48	Check capacitor; replace if defective.
		Defective power connector J2	Check pins A, B, and C of connector J2; check wiring between connector J2 and switch S1 and between S1 and printed circuit board.
4	No output indication on output meter or headset for any position of receiver volume control; 400 CPS indicator on test set lights.	J2. Defective switch S1 or resistors R51 through R58.	Check switch and resistors; replace defective part.
5	400 CPS indicator on test set does not light; normal output indication on output meter.	Defective transformer T15	Check resistance of secondary winding 3-4 (para 3-9).
		Defective part in switching circuits (Q9 or Q10).	Perform isolating procedure (para 3-7) to locate defective part.
		Defective power connector J2	Check pin J of connector J2; check wiring between connector and printed circuit board.
		Shorted capacitor C49	Check capacitor; replace if defective.
6	400 CPS indicator on test set does not light; output indication on output meter.	Receiver out of alignment	Align receiver (para 5-4).
7	400 CPS indicator in test set is lighted continuously with no signal input to receiver.	Defective part in switching circuits (Q9 or Q10).	Perform isolating procedures (para 3-7) to locate defective part.

3-6. Signal Substitution

a. General. Signal substitution procedures help to localize troubles to a stage or group of stages in the receiver. An externally generated signal is substituted for the signal normally present in each stage. The test equipment required for the tests is listed in paragraph 3-3. After the trouble has been localized through the use of these procedures, use the techniques outlined in paragraph 3-4 to isolate the trouble to a particular part.

b. Procedure.

(1) Connect the test setup shown in figure 3-4.

(2) Set the controls on the test set to the positions given in paragraph 3-4*b*.

(3) Set the volume control on the receiver to position 5 and adjust variable resistor R17 (fig. 6-15) to its maximum counterclockwise position.

(4) Adjust the output meter for an impedance of 150 ohms and set it on its lowest range.

(5) Turn on the power supply and adjust its output to 27.5 volts. Turn on the test equipment and allow a 15 minute warmup period.

(6) Set the rf signal generator to the frequency and output microvolts specified in the signal chart (*c* below) for the test point to which the rf signal generator will be connected. Adjust the rf signal generator for 50 percent modulation at an audio rate of 400 cps.

CAUTION

Transistors in the receiver can be damaged by application of excessive power. Do not exceed specified output values in the signal chart (*c* below). To avoid transistor damage when changing test points, disconnect the rf signal generator from the receiver and reset its frequency and output microvolts, as required, before connecting to the next test point.

(7) Connect the rf signal generator to the test points specified in the signal chart (*c* below) in the sequence given. Connect the red test lead to the test point through a coupling capacitor (0.03 microfarads (uf)) and connect the black test lead to the receiver case. Test point locations are shown in figure 3-5.

(8) For each test (*c* below), the output meter should indicate approximately 5 milliwatts of audio output.

c. Signal Chart.

	Input point		RF signal generator		
Sequence	Test point	Item	Frequency	Output microvolts	Stages checked
1	N	Q5 base	520 kc	2,600	Detector and audio.
2	M	Q4 base	520 kc	240	2d and 3d if. amplifiers.
3	L	Q3 base	520 kc	34	1st if. amplifier.
4	E	Q2 emitter	520 kc	19	T9, T10, T11.
5	B	T5-4	4.2 mHz	49	T5, T6, T7 and converter.
6	A	T4-3	75 mHz	2,000	Oscillator (70.8 mHz).

3-7. Isolating Troubles

When trouble has been localized to a stage, either through bench testing (para 3-4) or signal substitution (para 3-6), use the following techniques to isolate the defective part:

a. Take voltage measurements at the test points indicated in the voltage charts (para 3-8).

b. If voltage readings are abnormal, take resistance readings (para 3-9) to isolate open and short circuits.

c. If signals are weak and all checks fail to indicate a defective part, check the alignment of the receiver (para 5-4).

3-8. Voltage Measurements

All voltages indicated in the charts in *a* and *b* below are positive with respect to ground and are measured with the vtvm. All measured voltages should be within 15 percent of the values given in the charts. Refer to the voltage and resistance measurement and test point location illustration (fig. 3-5) for location of the test points called out in the charts.

a. To measure voltages with no signal input to the receiver, connect the receiver to the test set and supply power to the test set as shown in figure 3-1. If all measurements are correct, check the dc voltage measurements with an input signal applied to the receiver (*b* below).

Transistor		Function	Collector		Base		Emitter	
Q	Type		Test point	Voltage (no signal input)	Test point	Voltage (no signal input)	Test point	Voltage (no signal input)
1	2N1195	Oscillator		0		10		10
2	2N274	Converter	H	0	Q	15	E	15
3	2N274	First if. amplifier	S	0	L	9.8	R	10
4	2N274	Second if. amplifier	U	0	M	9.5	T	10.2
5	2N274	Third if. amplifier	W	0	N	13.7	V	13.9
6	2N1304	Agc amplifier	AJ	9.0	AH	22.0	AI	21.0
7	2N1304	First audio amplifier	Y	5.5	O	10.2	X	10.4
8	2N1304	Second audio amplifier	AA	1.5	P	14.0	Z	12.5
9	2N1304	Shaping amplifier	AD	26	AB	26	AC	26.5
10	2N1039	Light switch	AG	0	AE	26.5	AF	27.0

b. If all *no-signal* voltages are correct (*a* above), apply a 75-mc input signal of 50,000 microvolts, amplitude-modulated at an audio rate of 1,300 cps, to the antenna input terminal. Connect the equipment as shown in figure 3-1 and measure the voltages at the test points indicated in the chart below.

Transistor		Function	Collector		Base		Emitter	
Q	Type		Test point	Voltage with signal input	Test point	Voltage with signal input	Test point	Voltage with signal input
1	2N1195	Oscillator		0		14		14
2	2N274	Converter	H	0	Q	8.5	E	9.0
3	2N274	First if. amplifier	S	0	L	9.4	R	9.7
4	2N274	Second if. amplifier	U	0	M	16.9	T	16.9
5	2N274	Third if. amplifier	W	0	N	13.2	V	13.5
6	2N1304	Agc amplifier	AJ	16.8	AH	21.0	AI	21.0
7	2N1304	First audio amplifier	Y	5.2	O	10.8	X	11
8	2N1304	Second audio amplifier	AA	1.8	P	12.5	Z	12.8
9	2N1304	Shaping amplifier	AD	26.5	AB	26.5	AC	26.0
10	2N1039	Light switch	AG	26.0	AE	26.5	AF	26.5

3-9. Resistance Measurements

a. Transistor Resistance Measurements. Listed in the chart below are resistance measurements taken between the indicated test points and ground with the transistors connected in the circuit. The measurements are made with the vtvm. Where indicated, observe polarity when making measurements; in these cases, an incorrect polarity applied to the circuit can damage the transistors. Refer to the voltage and resistance measurement and test point location illustration (fig. 3-5) for location of the test points called out in the chart.

Transistor	*Test points*	*Resistance (ohms)*
Q1	Collector	less than 1
	Emitter	1,650 *
	Base	4,800
Q2	(H) Collector	7.2
	(E) Emitter	29,000 *
	(Q) Base	7,500
Q3	(S) Collector	390
	(R) Emitter	9,800 *
	(L) Base	83
Q4	(U) Collector	42
	(T) Emitter	10,000 *
	(M) Base	83
Q5	(W) Collector	40
	(V) Emitter	7,100 *
	(N) Base	40
Q6	(AJ) Collector	2,900
	(AI) Emitter	1,400 *
	(AH) Base	1,490
Q7	(Y) Collector	1,500
	(X) Emitter	3,400 *
	(O) Base	1,500
Q8	(AA) Collector	260
	(Z) Emitter	2,050 *
	(P) Base	4,600
Q9	(AD) Collector	1,100
	(AC) Emitter	730 *
	(AB) Base	920
Q10	(AG) Collector	100,000
	(AF) Emitter	1,160 *
	(AE) Base	1,000

*Readings taken with ohmmeter positive potential connected to ground.

b. Dc Resistances of Transformers and Coils (fig. 3-3). The dc resistance of the transformer windings and the coils in the receiver are listed in the chart below.

Transformer or coil	Terminals	Ohms
T1	1-2	Less than 1
	1-3	Less than 1
	2-3	Less than 1
T2	1-2	Less than 1
	1-3	Less than 1
	2-3	Less than 1
T3	1-2	Less than 1
	1-3	Less than 1
	2-3	Less than 1
T4	1-2	Less than 1
	1-3	Less than 1
	2-3	Less than 1
T5	1-2	Less than 1
	3-4	Less than 1
T6	1-2	Less than 1
	1-3	Less than 1
	2-3	Less than 1
T7	1-2	Less than 1
	3-4	Less than 1
T8	1-2	Less than 1
	1-3	Less than 1
	2-3	Less than 1

Transformer or coil	Terminals	Ohms
	4-5	Less than 1
T9	1-2	8
	1-3	7.8
	2-3	15
T10	1-2	7.5
	1-3	7.5
	2-3	15
T11	1-2	6.8
	3-4	34
T12	1-2	34
	3-4	715
T13	1-2	40
	3-4	7.2
T14	1-2	33
	3-4	13.7
T15	1-2	235
	3-4	80
	5-6	90
L1		Less than 1
L2	1-2	112
L3		Less than 1

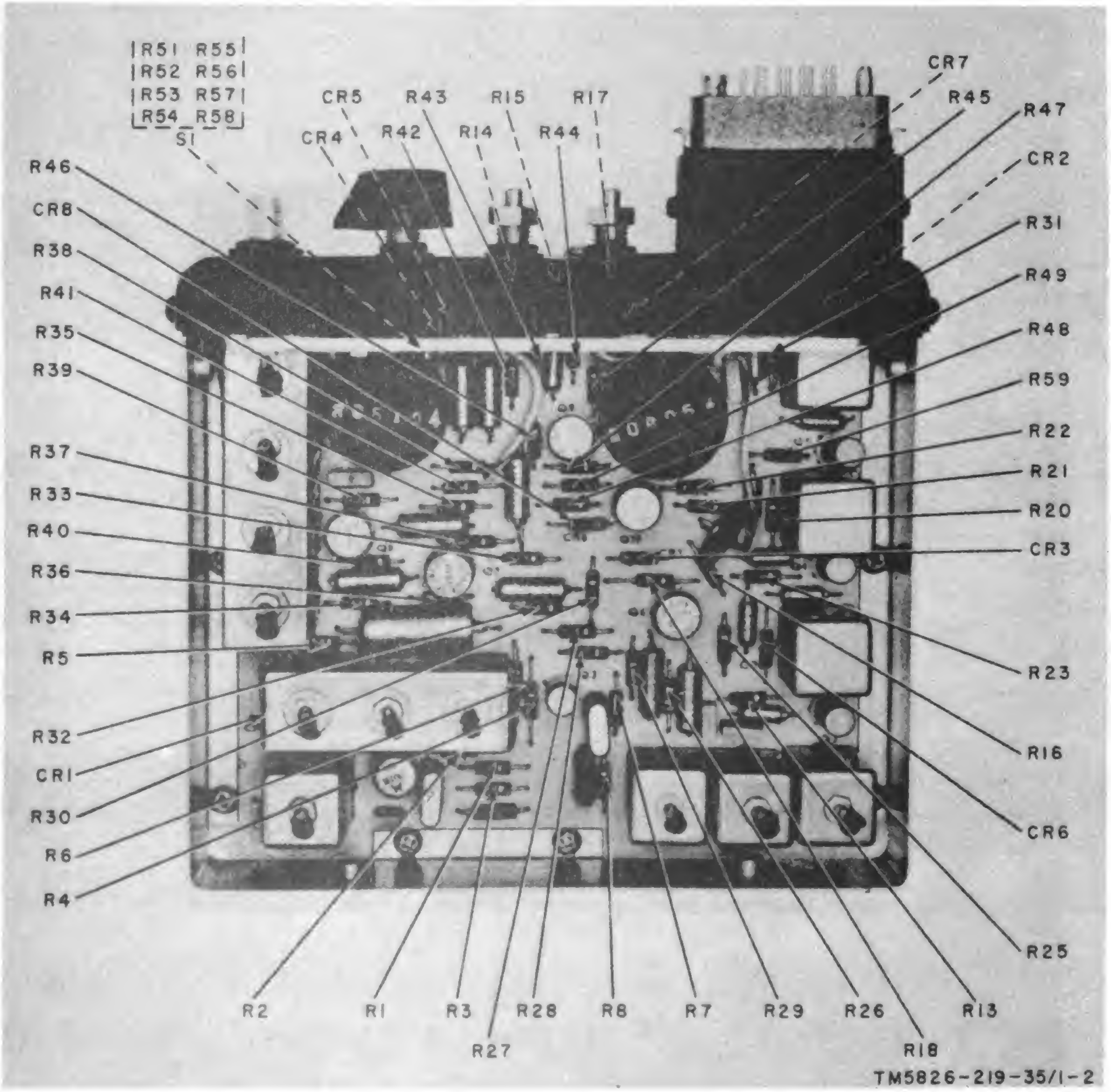


Figure 3-2. Location of diodes and resistors, top view.

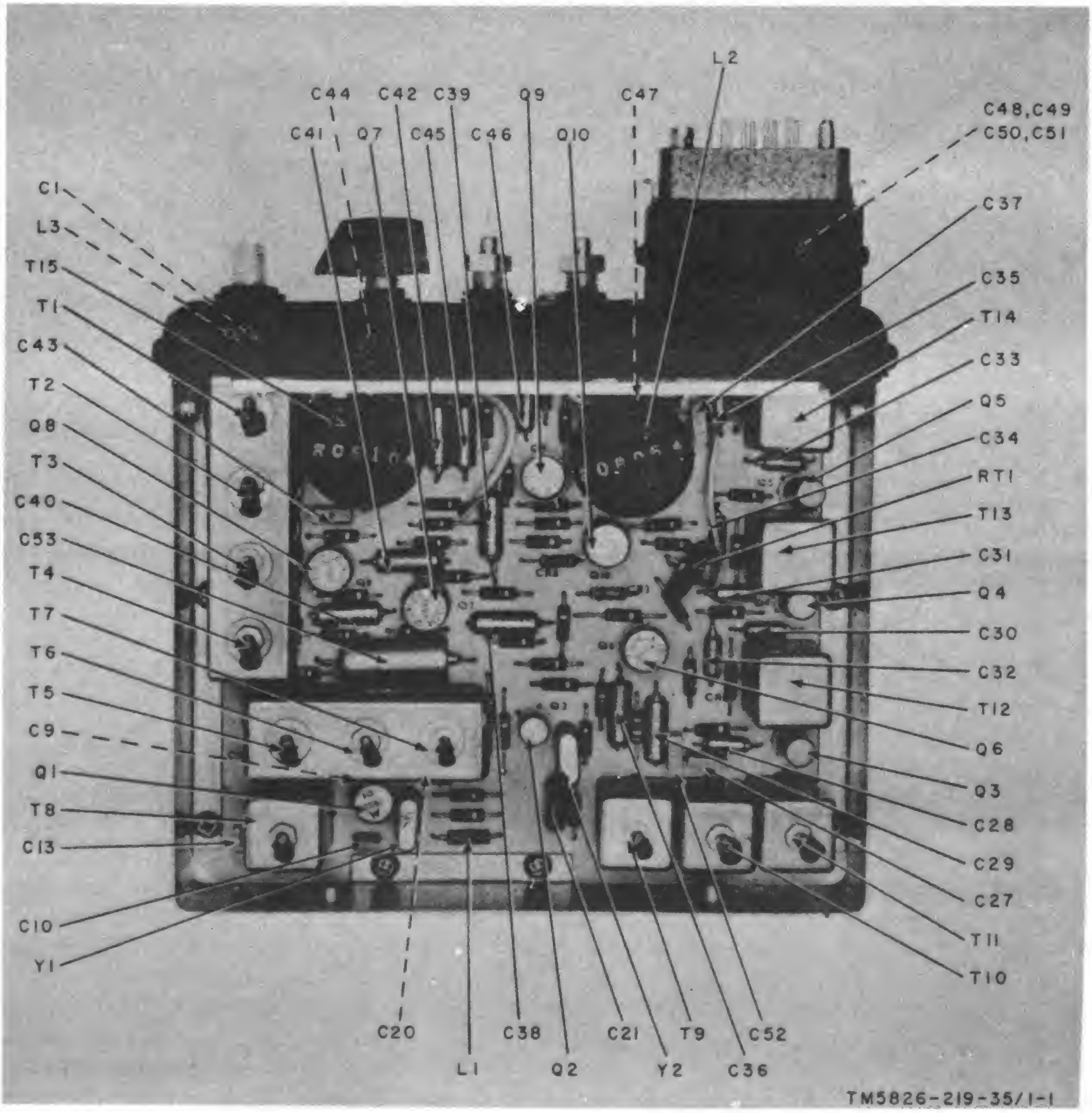
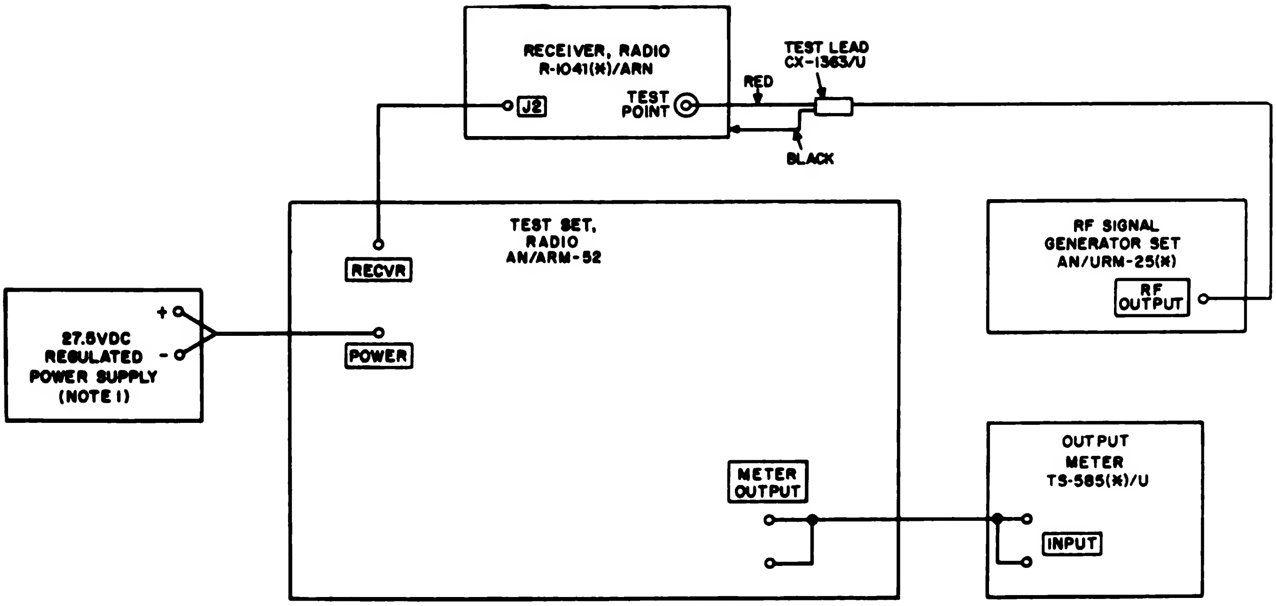


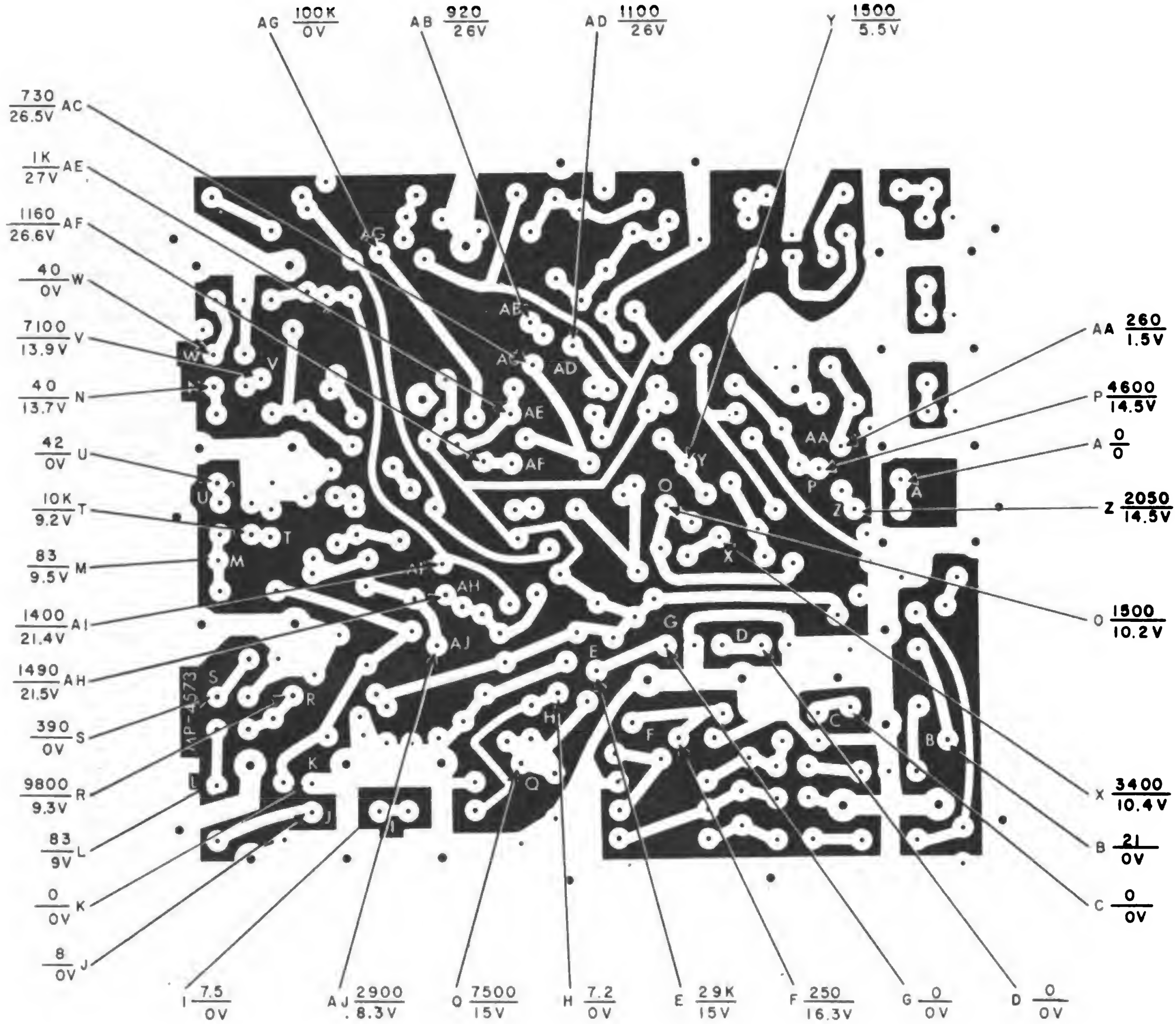
***Figure 3-3.** Location of capacitors, inductors, transformers, transistors, and crystals, top view.*



NOTES:
1. POWER SUPPLY PP-1104(*)/G OR EQUIVALENT.
2. ▭ INDICATES EQUIPMENT MARKINGS.

TM5826-219-35-13

Figure 3-4. Signal substitution, bench test setup.



NOTES
1. VIEW IS BOTTOM OF PRINTED BOARD.
2. ALL VOLTAGES ARE DC AND APPEAR BELOW THE REFERENCE LINE.
3. ALL RESISTANCES ARE IN OHMS UNLESS FOLLOWED BY K (1000 OHMS), AND APPEAR ABOVE THE REFERENCE LINE.
4. RESISTANCE MEASUREMENTS ARE MADE WITH POLARITY GIVEN IN THE, RESISTANCE CHART.
5. DC VOLTAGE MEASUREMENTS ARE MADE WITH RESPECT TO GROUND, NO SIGNAL INPUT AND +27.5 VOLTS APPLIED TO TERMINAL "E" OF J2.
6. VTVM USED FOR ALL RESISTANCE AND DC VOLTAGE MEASUREMENTS.
7. TOLERANCE ± 15 PERCENT.

TM5826-219-35/1-3

Figure 3-5. Voltage and resistance measurements and test point location diagram.

CHAPTER 4

REPAIRS AND ALIGNMENT

4-1. General Parts Replacement Techniques

Most of the parts in the R-1041B/ARN are mounted on the printed circuit board which is repaired or replaced by general support maintenance personnel. Switch S1 and resistors R51 through R58 (coarse volume control) are mounted on the rear panel. Connectors J1 and J2, variable resistors (sensitivity controls), and the rf filter assembly are mounted on the rear of the receiver. The following precautions should be observed when replacing any of the parts mounted on the rear panel:

a. When the feedthrough capacitors on the rf filter assembly are being soldered, be careful to prevent the glass portion of the capacitor from cracking when the center conductor becomes hot. Grasp the central lead with a pair of pliers between the glass bead and the eye of the terminal before applying heat.

b. Use a pencil-type soldering iron with a 25-watt maximum capacity. If only ac-operated irons are available, use an isolating transformer. Do not use a soldering gun; damaging voltages can be induced in components.

4-2. Repairs

a. Replacement of any of the parts mounted on the receiver rear panel requires removal of the case. Remove the screws that secure the case and slide the case off the receiver.

b. To replace switch S1 or any of its associated resistors, remove the rear panel to reach the part. Remove the case (*a* above) and then remove the screws that secure the receiver rear panel.

4-3. Adjustment of Sensitivity Controls

a. Connect the receiver, power supply, and test equipment as shown in figure 3-1.

b. Set the test set controls as follows:

Control	Position
Power switch	OFF
KEYER switch	OFF
SENSITIVITY switch	LO
SYSTEMS switch	1 LIGHT
METER OUTPUT-PHONES OUTPUT switch	METER OUTPUT.
Meter-adjusting screw	Zero indication on meter.

c. Adjust the output meter for an impedance of 150 ohms and set it on its lowest range.

d. Turn on the power supply and adjust the power supply voltage to 27.5 volts. Turn on the test set, signal generator, and audio oscillator. Allow a 15-minute warmup period before proceeding.

e. Set the receiver volume control to position 5.

f. Adjust the signal generator for an output frequency of 75 mc. Set the audio oscillator for a frequency of 1,300 cps and adjust its output power to modulate the signal generator 90 percent.

g. Adjust the signal generator for an output of 3,000 microvolts. Observe the 400 CPS indicator on the test set and adjust variable resistor R14 as indicated in (1) or (2) below. When variable resistor R14 is properly adjusted, the output meter should indicate at least 5 milliwatts.

(1) If the 400 CPS indicator is lighted, adjust variable resistor R14 counterclockwise until the indicator light goes out and then slowly adjust resistor R14 clockwise until the 400 CPS indicator lights.

(2) If the 400 CPS indicator is not lighted, slowly adjust variable resistor R14 clockwise until the indicator lights.

h. Decrease the signal generator output to 1,000 microvolts.

i. Set the test set SENSITIVITY switch to the HI position.

j. Observe the 400 CPS indicator on the test set and adjust variable resistor R17 as indicated in (1) or (2) below. When variable resistor R17 is properly adjusted, the output meter should indicate at least 5 milliwatts.

(1) If the 400 CPS indicator is lighted, adjust variable resistor R17 counterclockwise until the indicator light goes out and then slowly adjust variable resistor R17 clockwise until the 400 CPS indicator lights.

(2) If the 400 CPS indicator is not lighted, slowly adjust variable resistor R17 clockwise until the indicator lights.

CHAPTER 5
GENERAL SUPPORT MAINTENANCE

Section I. TROUBLESHOOTING

5-1. General Maintenance Information

General support maintenance of the R-1041B/ARN consists of repair of the printed circuit board, alignment of the receiver, and testing of repaired equipment. Use the troubleshooting techniques given in paragraphs 3-1 and 3-2 to localize and isolate the faulty part; the test equipment required is listed in paragraph 3-3. Before attempting to replace any part mounted on the printed circuit board, read the printed circuit board repair procedures given in paragraph 5-2.

5-2. Repair of Printed Circuit Board

The parts mounted on the printed circuit board are covered with varnish which must be removed on the conductor side of the board before a part can be replaced (*b*(1) below). Replace the defective part as indicated in *c* and *d* below; then cover the new part with varnish (*b*(2) below). The materials required for removing and replacing varnish are given in *a* below. For additional soldering techniques, refer to SB SIG 222.

a. Materials Required.

(1) M.F.R. Moisture and Fungus Resistance Varnish (Plasti-Kote No. 277).

(2) Trichlorethylene.

(3) Small stiff-bristle brush.

b. Procedure for Removing and Replacing Varnish in Receiver.

Warning: **When using trichlorethylene and varnish, work in a well-ventilated area and avoid inhalation of vapors. Prevent contact with skin and wash hands thoroughly after using. Maintain good housekeeping and personal hygiene standards.**

(1) *Removal.* Varnish may be removed with a small stiff-bristle brush moistened in trichlorethylene.

(2) *Replacement.* When parts in the receiver are replaced, new varnish must be applied to the affected areas. Allow the varnish to air cure for a minimum of 8 hours.

c. Solder Parts Removal.

Caution: **When soldering diode or transistor leads, solder quickly; where space permits, use a heat sink (such as long-nosed pliers) between the soldered joint and the part. Excessive heat can damage the diode or transistor.**

(1) When circuit troubleshooting discloses a defective part, replace it by unsoldering the leads and resoldering the new part in place. Never use soldering guns or heavy-duty soldering irons for soldering operations in transistor circuits or on printed boards. The excessive heat will damage the diodes and transistors and can cause the printed wiring on the board to curl away from the dielectric. Use only a light-duty 20- to 25-watt soldering iron with no leakage current. To check a soldering iron for leakage, connect one lead of the TS-352(*)/U to ground (water pipe or powerline ground) and the other lead to the tip of the soldering iron. Set the TS-352(*)/U range switch to the 250-volt scale. Allow the soldering iron to reach correct operating temperature and note the meter reading. Reverse

the ac plug of the soldering iron and again note the meter reading. If the meter indicates for either position of the ac plug, the iron has leakage. If any doubt exists about leakage, use an isolation transformer. If an isolation transformer is not available, remove the ac plug of the soldering iron from the ac receptacle after the iron has reached soldering operation. When the iron cools, reheat by reinserting the ac plug into the ac receptacle. When soldering components into the circuit, be sure cold-soldered joints do not result. If a small-tipped low-wattage iron is not available, use a piece of No. 10-AWG copper wire wrapped around the tip of a higher-wattage iron and protruding beyond the tip of the iron.

(2) Before removing or replacing a defective part, visually inspect the printed circuit board to determine the location of all diodes and transistors. While performing soldering operations, be sure no part of the soldering iron makes contact with any of the diodes or transistors. The heat from the iron will damage any diode or transistor with which it comes in contact. When replacing a part, such as a capacitor or resistor, cut the leads within one-eighth inch of the board and remove the body of the part; then, to remove the ends of the leads, touch the soldering iron to the soldered joints and remove the leads with a pair of long-nosed pliers, or shake the board to free the leads after the solder has become molten. Be especially careful during this operation; during manufacture, the leads are usually crimped after insertion in the holes. Remove the crimped ends carefully to prevent damage to the printed circuit board. When removing the leads, never apply more heat than required to cause solder to flow. Excessive heat will cause the printed circuit wiring to raise from the board.

d. Soldered Parts Replacement. Prepare the replacement part by shaping its leads to conform with the spacing of the holes in the board. Make sure the holes are clear of solder and the solder areas are clean. Insert the leads of the component through the holes in the board. Apply a small amount of noncorrosive liquid soldering flux to the joints to be soldered with a toothpick or similar applicator. Before applying solder, thoroughly clean and tin the point of a 20- to 25-watt iron. After tinning, apply a small amount of solder to the tip of the iron and shake off all excess solder at the tip. Apply the tip to the joint to be soldered long enough to permit the solder remaining on the tip to flow into the joint. Do not use an excessive amount of solder or soldering flux, otherwise the molten solder may spread to adjacent connections and cause short circuits. The excess lead lengths should be cut off close to the solder globules formed by the soldering operation after the joints have cooled. To prevent corrosion, remove all excess soldering flux from the joints and the adjacent board areas.

Section II. ALIGNMENT

5-3. Test Equipment and Materials Required for Alignment

The following chart lists the test equipment and materials required for alignment for the receiver:

Test equipment	Common name
Adapter UG-274A/U	Adapter tee
Attenuator, Boonton 505A	6-db pad
Audio Oscillator TS-382 (*)/U[a]	Audio oscillator
Frequency Meter AN/USM-26	Frequency meter
Generator, Signal AN/USM-44(*)[b].	Signal generator
Output Meter TS-585 (*)/U[c].	Output meter
Power Supply PP-1104 (*)/G[d] (or equivalent).	Power supply
Radio Frequency Signal Generator Set AN/URM-25(*)[e].	Rf signal generator.
Test Set, Radio AN/ARM-52	Test set

Test equipment	Common name
470-ohm, 1/2-watt resistor (2 each).	470-ohm resistor
1,500-ohm, 1/2-watt resistor (2 each).	1,500-ohm resistor.

[a]Indicates TS-382B/U, TS-382D/U, TS-382E/U, and TS-382F/U.
[b]Indicates AN/USM-44 and AN/USM-44A.
[c]Indicates TS-585A/U, TS-585B/U, TS-585C/U, and TS-585D/U.
[d]Indicates PP-1104A/U and PP-1104B/U.
[e]Indicates AN/URM-25A, AN/URM-25B, AN/URM-25C, and AN/URM-25D.

5-4. Alignment Procedure

Two different test setups are required for alignment of the receiver. The test setup shown in figure 8 is used for alignment of the 520-kc if. bandpass filter (para 5-5); the test setup shown in figure 6 is used for alignment of the oscillator (para 5-6), 4.2-mc bandpass filter (para 5-7); and preselector (para 5-8). Prepare the receiver and test equipment as follows:

a. Connect the receiver, power supply, test set, and audio output meter as shown in figure 3-4. Set the test controls as follows:

Control	Position
POWER switch	OFF
KEYER switch	OFF
SENSITIVITY switch	HI
SYSTEMS switch	1 LIGHT
METER OUTPUT-PHONES OUTPUT switch.	METER OUTPUT.
Meter-adjusting screw	Zero indication on meter.

b. Connect the frequency meter, audio oscillator, signal generator, and rf signal generator to the ac power source.

c. Turn on the power supply and adjust its output to 27.5 volts and then turn on the remainder of the test equipment. Allow a 15-minute warmup period before proceeding.

d. Set the volumn control on the receiver to position 5.

e. If the complete receiver is to be aligned, perform the procedures given in paragraphs 5-5 through 5-8 in the sequence given. If only a section of the receiver requires alignment, proceed directly to the required procedure. Connect the test equipment (*b* above) to the test setup referenced in the alignment procedure being performed.

f. After completing the required alignment procedures, turn off all equipment and disconnect the receiver from the test setup.

5-5. Alignment of 520-Kc If. Bandpass Filter

a. Adjust the output meter (fig. 3-4) for an impedance of 150 ohms and set it on its lowest range.

b. Set the rf signal generator for 520 kc and adjust the audio oscillator for an output of 400 cps. Adjust the rf signal generator to obtain 80-percent modulation.

c. Connect the red test lead to test point F (fig. 3-5) through a capacitor (0.03 microfarad) and connect the black test lead to the receiver case (ground).

d. Adjust the rf signal generator output for a 5-milliwatt reading on the output meter. Adjust variable resistor R17 (fig. 3-2) for a maximum indication on the output meter.

Note. During the alignment procedure, adjust the rf signal generator output level as required to maintain an indication of 5 milliwatts on the output meter.

e. Connect a 470-ohm resistor across the tuned primary winding (terminals 1 and 2) of transformer T11 (fig. 6-15); connect another 470-ohm resistor across filter T10 (terminals 1 and 2).

f. Adjust the core of bandpass filter T9 (fig. 3-3) for a maximum indication on the output meter.

g. Remove the 470-ohm resistor from bandpass filter T10 and connect it to bandpass filter T9 (terminals 1 and 2). Adjust the core of transformer T10 for a maximum indication on the output meter.

h. Remove the 470-ohm resistor from transformer T11 and connect it to bandpass filter T10 (terminals 1 and 2). Adjust the core of transformer T11 for a maximum indication on the output meter.

i. To check for proper alignment of the 520-kc if. bandpass filter, remove the two loading resistors (*g* and *h* above) and adjust the rf signal generator output level for an indication

of 5 milliwatts on the output meter. Double the rf signal generator output and adjust the signal generator frequency below and above 520 kc and note the frequencies where the output is 5 milliwatts; the frequencies should be 480 kc or below and 560 kc or above respectively.

5-6. Alignment of Oscillator

a. Connect the test setup shown in figure 6-1.

b. Adjust the output meter to provide a 150-ohm load and to indicate 30 milliwatts.

c. Set the signal generator for an output of 75 mc; use the frequency meter to check the signal generator frequency. Adjust the audio oscillator for an output of 400 cps and adjust the signal generator for 90-percent modulation.

d. Adjust the core of transformer T8 (fig. 3-3) until an output is observed on the output meter. Rotate the core adjustment clockwise until the output indication drops off abruptly. This indicates that oscillations have ceased.

e. Rotate the core adjustment of transformer T8 counterclockwise slowly until the output reappears. Continue to rotate the core one complete turn. This represents the point of maximum stability for the oscillator.

5-7. Alignment of 4.2-Mc Bandpass Filter

a. Adjust the output meter (fig. 6-1) to provide a 150-ohm load and set it on its lowest range.

b. Set the signal generator for an output of 75 mc; use the frequency meter to check the signal generator frequency. Adjust the audio oscillator for an output of 400 cps and adjust the signal generator for 90-percent modulation.

c. Connect a 470-ohm resistor across the secondary winding (terminals 3 and 4) of transformer T7 (fig. 6-7). Connect a 1,500-ohm resistor across the output (terminals 1 and 3) of filter T6.

d. Adjust the signal generator output for an indication of 5 milliwatts on the output meter.

Note. During the alignment procedure, adjust the signal generator output level as required to maintain an indication of 5 milliwatts on the output meter.

e. Adjust the core of transformer T5 (fig. 3-3) for a maximum indication on the output meter.

f. Remove the 1,500-ohm resistor from bandpass filter T6 and connect it across the secondary winding (terminals 1 and 2) of transformer T5. Adjust the core of transformer T6 for a maximum indication on the output meter.

g. Remove the 470-ohm resistor from transformer T7. Connect a 1,500-ohm resistor across the output (terminals 1 and 3) of filter T6. Leave the 1,500-ohm resistor connected across the secondary winding of transformer T5.

h. Adjust the core of transformer T7 for a maximum indication on the output meter.

i. Disconnect the 1,500-ohm resistor from transformer T5 and filter T6.

5-8. Alignment of Preselector

a. Perform the procedures given in paragraph 5-7*a* and *b*.

b. Adjust the cores of bandpass filters T1, T2, T3, and T4 (fig. 3-3), in sequence, for a maximum indication on the output meter.

CHAPTER 6

DEPOT OVERHAUL STANDARDS

6-1. Applicability of Depot Overhaul Standards

The tests outlined in this chapter are designed to measure the performance capability of a repaired equipment. Equipment that is to be returned to stock should meet the standards given in these tests.

6-2. Applicable Reference

a. Repair Standards. Applicable procedures of the depot performing these test and the general standards for repaired electronic equipment given in TB SIG 355-1, TB SIG 355-2, and TB SIG 355-3 form a part of the requirements for testing this equipment.

b. Technical Publication. Operation and organizational maintenance of this equipment is contained in TM 11-5826-219-12.

c. Modification Work Orders. Perform all modification work orders applicable to this equipment before making the tests specified.

6-3. Test Facilities Required

The following equipments, or suitable equivalents, will be used in determining compliance with the requirements of this Depot Inspection Standard.

a. Test Equipment.

Nomenclature	Federal stock No.	Common names
Generator, Signal AN/USM-44(*)[a].	6625-669-0258	Signal generator
Audio Oscillator TS-382(*)/U[b].	6625-192-5094	Audio oscillator
Output Meter TS-585(*)/U[c].	6625-244-0501	Output meter
Frequency Meter AN/USM-26.	6625-692-6553	Frequency meter
Power Supply PP-1104(*)/G[d].	6130-542-6385	Power supply
Test Set, Radio AN/ARM-52.	6625-753-1954	Test set

[a]Indicates AN/USM-44 and AN/USM-44A.
[b]Indicates TS-382B/U, TE-382D/U, TS-382E/U, and TS-382F/U.
[c]Indicates TS-585A/U, TS-585B/U, TS-585C/U, and TS-585D/U.
[d]Indicates PP-1104A/G and PP-1104B/G.

b. Materials.

Material	Federal stock No.	Quantity
Adapter UG-274A/U	5935-201-2411	1 ea
Attenuator, Boonton 505A (6 db pad).		1 ea
Coaxial Cable RG-58C/U	6145-542-6092	4 ft
Connector UG-88E/U	5935-823-0833	2 ea
Connector IPC-4600	5935-170-5361	2 ea
Connector, plug, electrical	5935-283-7130	1 ea
Wire, electrical, stranded, #10 AWG	6145-160-5110	20 ft

6-4. General Test Equipment

Most of the tests will be performed under the conditions given below and illustrated in figure 6-1. Testing will be simplified if connections and panel control settings are made initially and modifications are made as required for the individual tests.

a. Connect the test setup shown in figure 6-1.

b. Set the controls on the test set as follows:

Control	Position
POWER switch	OFF.
KEYER switch	OFF.
SENSITIVITY switch	HI
SYSTEMS switch	1 LIGHT
METER OUTPUT-PHONES OUTPUT switch.	METER OUTPUT.
Meter-adjusting screw	Zero indication on meter.

c. Turn on the power supply and adjust its output to 27.5 volts. Turn on the remainder of the test equipment. Allow at least 1 hour for all equipment to reach stabilized temperatures.

d. Adjust the output meter for an impedance of 150 ohms and set it on its lowest range.

6-5. Sensitivity Test

a. Set the receiver volume control to position 5.

b. Adjust the signal generator for an output frequency of 75 mc. Set the audio oscillator for a frequency of 1,300 cps and adjust its output power to modulate the signal generator 90 percent.

c. Increase the signal generator output until the 400 CPS indicator on the test set lights. The signal generator output should be 1,000 microvolts ±1 db and the output meter should indicate a minimum of 5 milliwatts; note the output meter indication for future use.

d. Vary the audio oscillator frequency from 380 cps to 3,150 cps. The output indicated on the output meter should not vary more than 3 db from the output indication noted in *c* above.

e. Readjust the audio oscillator frequency to 1,300 cps.

f. Place the test set SENSITIVITY switch to the LO position.

g. Increase the signal generator output until the 400 CPS indicator on the test set lights. The signal generator output should be 3,000 microvolts ±1 db and the output meter should indicate a minimum of 5 milliwatts; note the output meter indication.

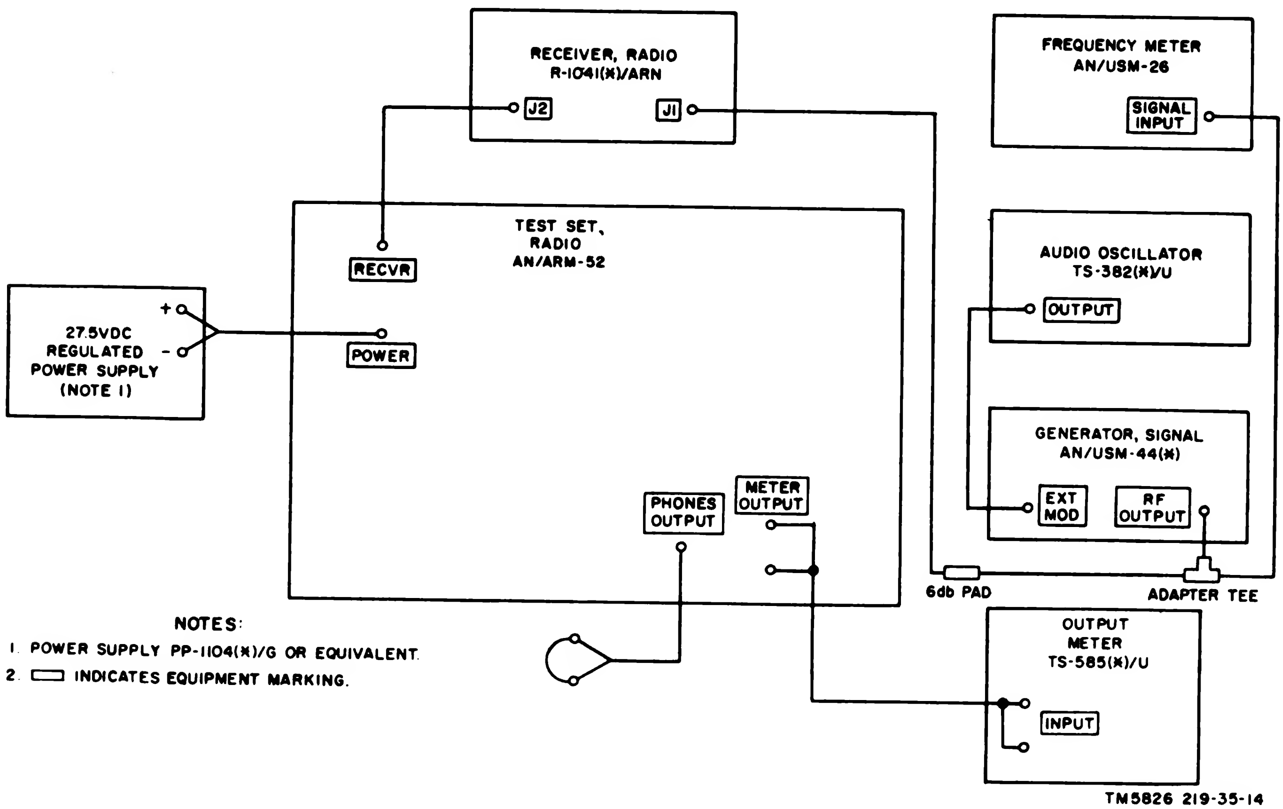


Figure 6-1. Connections for final testing.

6-6. Selectivity Test

a. Set the receiver volume control to position 5.

b. Adjust the signal generator for an output frequency of 75 mc. Set the audio oscillator for a frequency of 1,300 cps and adjust its output power to modulate the signal generator 90 percent.

c. Adjust the signal generator output for an indication of 5 milliwatts on the output meter.

d. Record the output attenuator setting of the AN/USM-44 signal generator.

e. Increase the output of the AN/USM-44 signal generator by 6 db and record output in db.

f. Adjust the AN/USM-44 frequency control above the center frequency (75 MC), until the output as monitored on the TS-585 output meter returns to 5 milliwatts.

g. Operate the MOD. SELECTOR switch on the AN/USM-44 to CW.

h. Increase the AN/USM-44 output to obtain frequency reading on the AN/USM-26. Record the frequency.

i. Operate the MOD. SELECTOR switch on the AN/USM-44 signal generator to EXT. MOD. and adjust the output attenuator to the setting recorded in *e* above.

j. Adjust the AN/USM-44 frequency control below the center frequency (75 MC) until the output as monitored on the TS-585 output meter returns to 5 milliwatts.

k. Repeat steps *g.* and *h* above and record frequency reading.

l. The over-all selectivity of the receiver shall be not less than ±40 KC from the center frequency at 6 db down points (Total bandwidth at least 80 KC).

m. Repeat steps *d* through *l* above except in step *e* increase signal generator output to 60 db. The over-all selectivity of the receiver shall be less than ±150 KC from center frequency. The overall bandwidth of the receiver shall not exceed 300 KC.

6-7. Automatic Gain Control Test

a. Set the receiver volume control to position 5.

b. Adjust the signal generator for an output frequency of 75 mc. Set the audio oscillator for a frequency of 1,300 cps and adjust its output power to modulate the signal generator 90 percent.

c. Adjust the signal generator output for an indication of 12.5 milliwatts on the output meter. Note the output meter db indication.

d. Increase the signal generator output by 40 db. The indication on the meter should not increase more than 6 db from the indication noted in *c* above.

6-8. Audio Attenuation Test

a. Set the receiver volume control to position 5.

b. Adjust the signal generator for an output frequency of 75 mc. Set the audio oscillator for a frequency of 1,300 cps and adjust its output power to modulate the signal generator 90 percent.

c. Adjust the signal generator output for an indication of 10 db on the output meter.

d. Rotate the receiver volume control one step counterclockwise. The output meter should indicate from 3.5 to 6.5 db lower than the indication obtained in *c* above.

e. Repeat the procedure given in *d* above for all steps of the volume control. Each step should provide an output indication from 3.5 to 6.5 db lower than the previous step; for the four steps, the total minimum decrease in the output level should be 18 db.

6-9. Image Frequency Test

a. Set the receiver volume control to position 5.

b. Adjust the signal generator for an output frequency of 75 mc. Set the audio oscillator for a frequency of 1,300 cps and adjust its output power to modulate the signal generator 90 percent.

c. Increase the signal generator output until the 400 CPS indicator on the test set lights. The signal generator output should not exceed 1,000 microvolts and the output meter should indicate a minimum of 5 milliwatts.

d. Increase the signal generator output to obtain an indication of 1 milliwatt on the output meter. Note the signal generator output voltage.

e. Tune the signal generator to 66.6 mc.

f. Tune the audio oscillator to 400 cps and adjust its output power to modulate the signal generator 30 percent.

g. Increase the signal generator output to obtain an indication of 1 milliwatt on the output meter. The signal generator output voltage should be 50 db above or greater than the output voltage noted in *d* above. For example, if the output voltage noted in *d* above was 100 microvolts, then the present signal generator output voltage should be 30,000 microvolts or greater.

6-10. Keyed 4-Cps Test

(fig. 6-7)

a. Connect the equipment as shown in figure 6-2, except as follows:

(1) Connect the output from the audio oscillator to the EXT MOD input jack on the signal generator.

(2) Do not connect the test cable to the KEYER

OUTPUT 4 CPS jack.

b. Set the METER OUTPUT-PHONES OUTPUT switch on the test set to the PHONES OUTPUT position.

c. Set the receiver volume control to position 5.

d. Adjust the signal generator for an output frequency of 75 mc. Set the audio oscillator for a frequency of 1,300 cps and adjust its output power to modulate the signal generator 90 percent.

e. Reconnect the test equipment as follows:

(1) Disconnect the audio oscillator from the signal generator.

(2) Connect the audio oscillator output to the KEYER INPUT 4 CPS jack.

(3) Connect the test set output from the KEYER OUTPUT 4 CPS jack to the EXT MOD input jack on the signal generator.

f. Set the test set KEYER switch to the ON position.

g. Increase the signal generator output until the 400 CPS indicator on the test set lights. The signal generator output should be approximately 1,000 microvolts; the 400 CPS indicator should flash and the audio tone should be interrupted at the keying rate of 4 cps.

h. Set the test set SENSITIVITY switch to the LO position.

i. Repeat the procedure given in *g* above; the signal generator output should be approximately 3,000 microvolts.

6-11. Keyed 6 Cps Test

(fig. 6-3)

a. Connect the equipment as shown in figure 6-3.

b. Set the receiver volume control to position 5.

c. Adjust the signal generator for an output frquency of 75 mc. Set the audio oscillator for a frequency of 1,300 cps and adjust its output power to modulate the signal generator 90 percent.

d. Set the test set SENSITIVITY switch to the HI position.

e. Increase the signal generator output until the 400 CPS indicator on the test set lights. The signal generator output should be approximately 1,000 microvolts; the 400 CPS indicator should flash and the audio tone should be interrupted at the keying rate of 6 cps.

f. Slowly increase the signal generator output to approxiately 70 millivolts. The indicator light and the audio tone should follow the keying rate of the test set as the signal input to the receiver is increased.

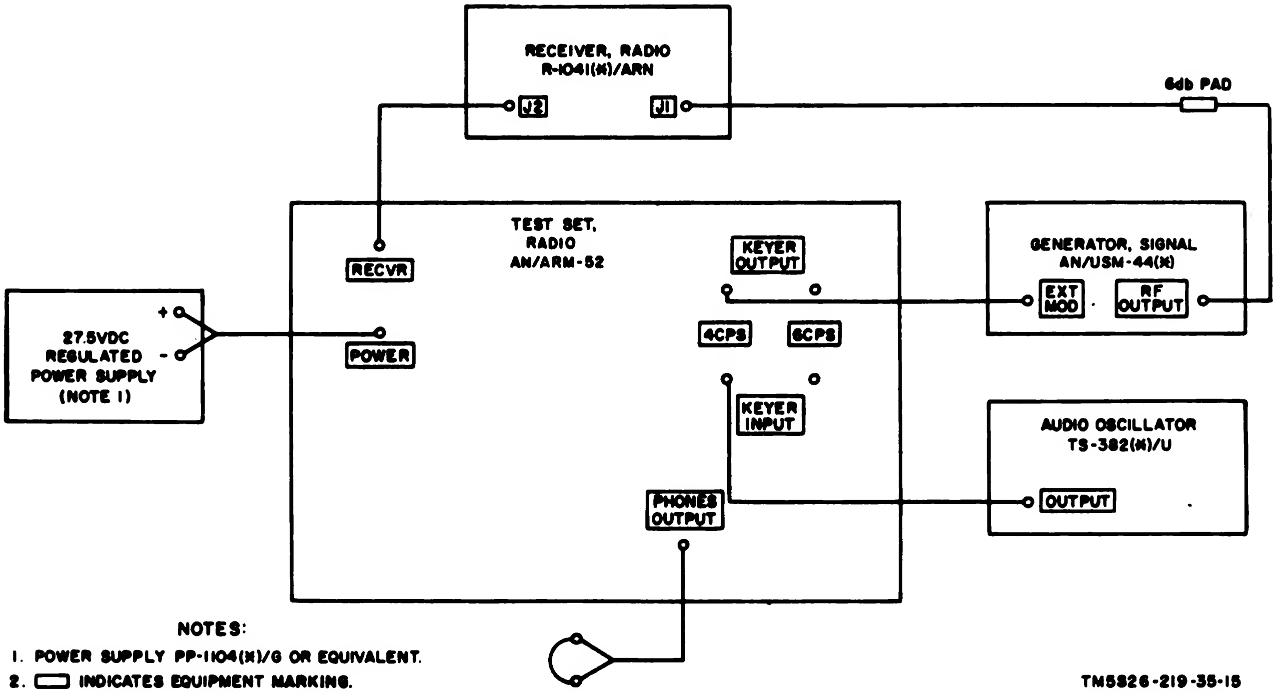


Figure 6-2. Test setup for keyed 4-cps test.

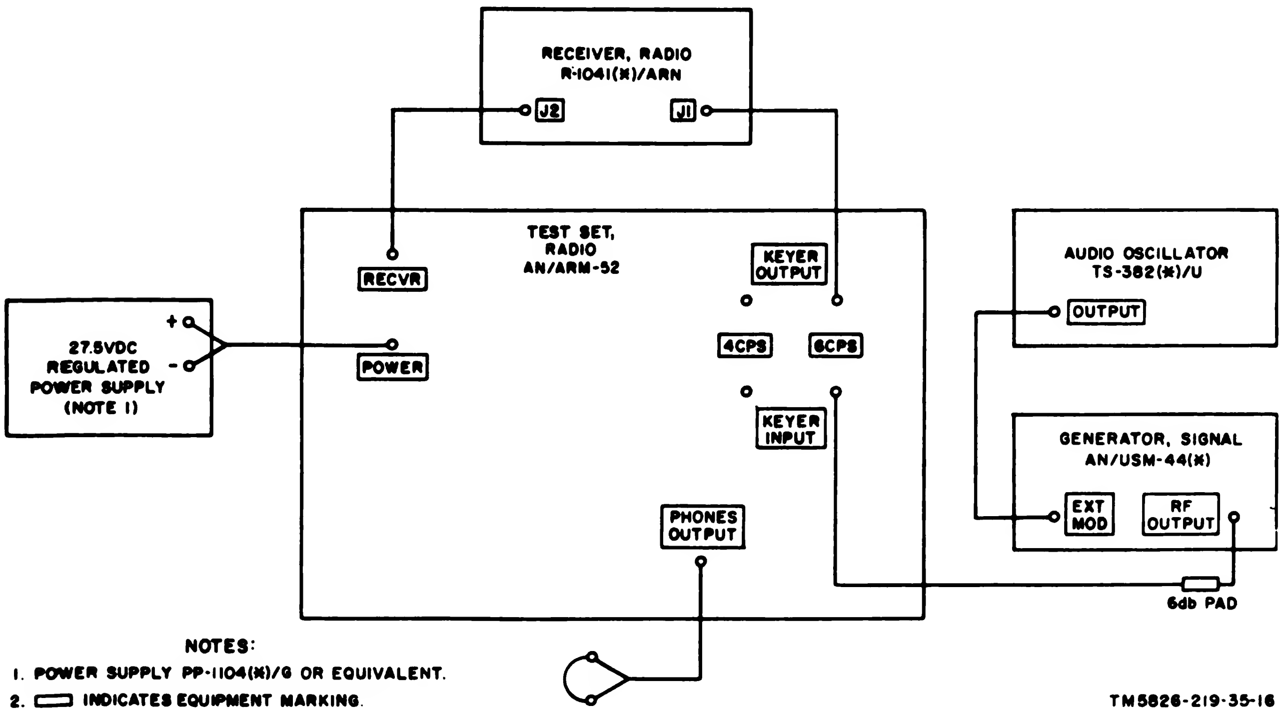


Figure 6-3. Test setup for keyed 61-cps test.

APPENDIX
REFERENCES

Following is a list of references available to the DS, GS, and depot maintenance repairmen of the R-1041B/ARN:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	US Army Equipment Index of Modification Work Orders.
TB SIG 222	Solder and Soldering.
TB SIG 355-1	Depot Inspection Standard for Repaired Signal Equipment.
TB SIG 355-2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TM 11-5017	Output Meters TS-585A/U, TS-585B/U, TS-585C/U, and TS-585D/U.
TM 11-5126	Power Supplies PP-1104A/G and PP-1104B/G.
TM 11-5551A	R.F. Signal Generator Set AN/URM-25A.
TM 11-5551B	R.F. Signal Generator Set AN/URM-25B.
TM 11-5551C	R.F. Signal Generator Set AN/URM-25C.
TM 11-5551D	R.F. Signal Generator Set AN/URM-25D.
TM 11-5826-219-12	Operator and Organizational Maintenance Manual: Receivers, Radio R-1041/ARN, R-1041A/ARN, and R-1041B/ARN.
TM 11-6625-200-15	Operator, Organizational, DS, GS and Depot Maintenance Manual: Multimeters ME-26A/U, ME-26B/U, ME-26C/U, and ME-26D/U.
TM 11-6625-212-15	Operator's, Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Frequency Meters AN/USM-26 and AN/USM-26A.
TM 11-6625-261-12	Operator's and Organizational Maintenance Manual: Audio Oscillators TS-382A/U, TS-382B/U, TS-382D/U, TS-383E/U, and TS-382F/U.
TM 11-6625-508-10	Operator's Manual: Signal Generators AN/USM-44 and AN/USM-44A.
TM 11-6625-539-15	Operator's, Organizational, Field and Depot Maintenance Manual: Transistor Test Set TS-1836/U.

TABLE 3 — FOR USE WITH STYLES CM, CN, CY AND CB.

COLOR	MIL ID	1ST SIG FIG.	2D SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]			DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CB	CM	CY, CM	CM
BLACK	CM, CY CB	0	0	1			±20%	±20%		A			-55° TO +70°C	10-55 HZ
BROWN		1	1	10					B	E	B			
RED		2	2	100	±2%		±2%	±2%	C				-55° TO +85°C	
ORANGE		3	3	1,000		±30%			D		D	300		
YELLOW		4	4	10,000					E				-55° TO +125°C	10-2,000Hz
GREEN		5	5		±5%				F			500		
BLUE		6	6										-55° TO +150°C	
PURPLE (VIOLET)		7	7											
GRAY		8	8											
WHITE		9	9											
GOLD				0.1			±5%	±5%						
SILVER	CN			0.01	±10%	±10%	±10%	±10%						

TABLE 4 — TEMPERATURE COMPENSATING, STYLE CC.

COLOR	TEMPERATURE COEFFICIENT[4]	1ST SIG FIG.	2D SIG FIG.	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10 UUF	CAPACITANCES 10 UUF OR LESS	
BLACK	0	0	0	1		± 2.0 UUF	CC
BROWN	-30	1	1	10	±1%		
RED	-80	2	2	100	±2%	±0.25 UUF	
ORANGE	-150	3	3	1,000			
YELLOW	-220	4	4				
GREEN	-330	5	5		±5%	±0.5 UUF	
BLUE	-470	6	6				
PURPLE (VIOLET)	-750	7	7				
GRAY		8	8	0.01*			
WHITE		9	9	0.1*	±10%		
GOLD	+100			0.1		±1.0 UUF	
SILVER				0.01			

1 THE MULTIPLIER IS THE NUMBER BY WHICH THE TWO SIGNIFICANT (SIG) FIGURES ARE MULTIPLIED TO OBTAIN THE CAPACITANCE IN UUF

2 LETTERS INDICATE THE CHARACTERISTICS DESIGNATED IN APPLICABLE SPECIFICATIONS MIL-C-5, MIL-C-25D, MIL-C-11272B, AND MIL-C-10950C RESPECTIVELY.

3 LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D

4 TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE

* OPTIONAL CODING WHERE METALLIC PIGMENTS ARE UNDESIRABLE.

ESC-FM 913-73

TABLE 3 — FOR USE WITH STYLES CM, CN, CY AND CB.

COLOR	MIL ID	1ST SIG FIG.	2D SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]			DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CB	CM	CY, CM	CM
BLACK	CM, CY CB	0	0	1			±20%	±20%		A			-55° TO +70°C	10-55 HZ
BROWN		1	1	10					B	E	B			
RED		2	2	100	±2%		±2%	±2%	C				-55° TO +85°C	
ORANGE		3	3	1,000		±30%			D		D	300		
YELLOW		4	4	10,000					E				-55° TO +125°C	10-2,000HZ
GREEN		5	5		±5%				F			500		
BLUE		6	6										-55° TO +150°C	
PURPLE (VIOLET)		7	7											
GRAY		8	8											
WHITE		9	9											
GOLD				0.1			±5%	±5%						
SILVER	CN			0.01	±10%	±10%	±10%	±10%						

TABLE 4 — TEMPERATURE COMPENSATING, STYLE CC.

COLOR	TEMPERATURE COEFFICIENT[4]	1ST SIG FIG.	2D SIG FIG.	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10 UUF	CAPACITANCES 10 UUF OR LESS	
BLACK	0	0	0	1		± 2.0 UUF	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	±2 %	± 0.25 UUF	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5 %	± 0.5 UUF	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GRAY		8	8	0.01*			
WHITE		9	9	0.1*	± 10%		
GOLD	+100			0.1		± 1.0 UUF	
SILVER				0.01			

1. THE MULTIPLIER IS THE NUMBER BY WHICH THE TWO SIGNIFICANT (SIG) FIGURES ARE MULTIPLIED TO OBTAIN THE CAPACITANCE IN UUF.

2. LETTERS INDICATE THE CHARACTERISTICS DESIGNATED IN APPLICABLE SPECIFICATIONS: MIL-C-5, MIL-C-25D, MIL-C-11272B, AND MIL-C-10950C RESPECTIVELY.

3. LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D

4. TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE

* OPTIONAL CODING WHERE METALLIC PIGMENTS ARE UNDESIRABLE.

ESC-FM 913-73

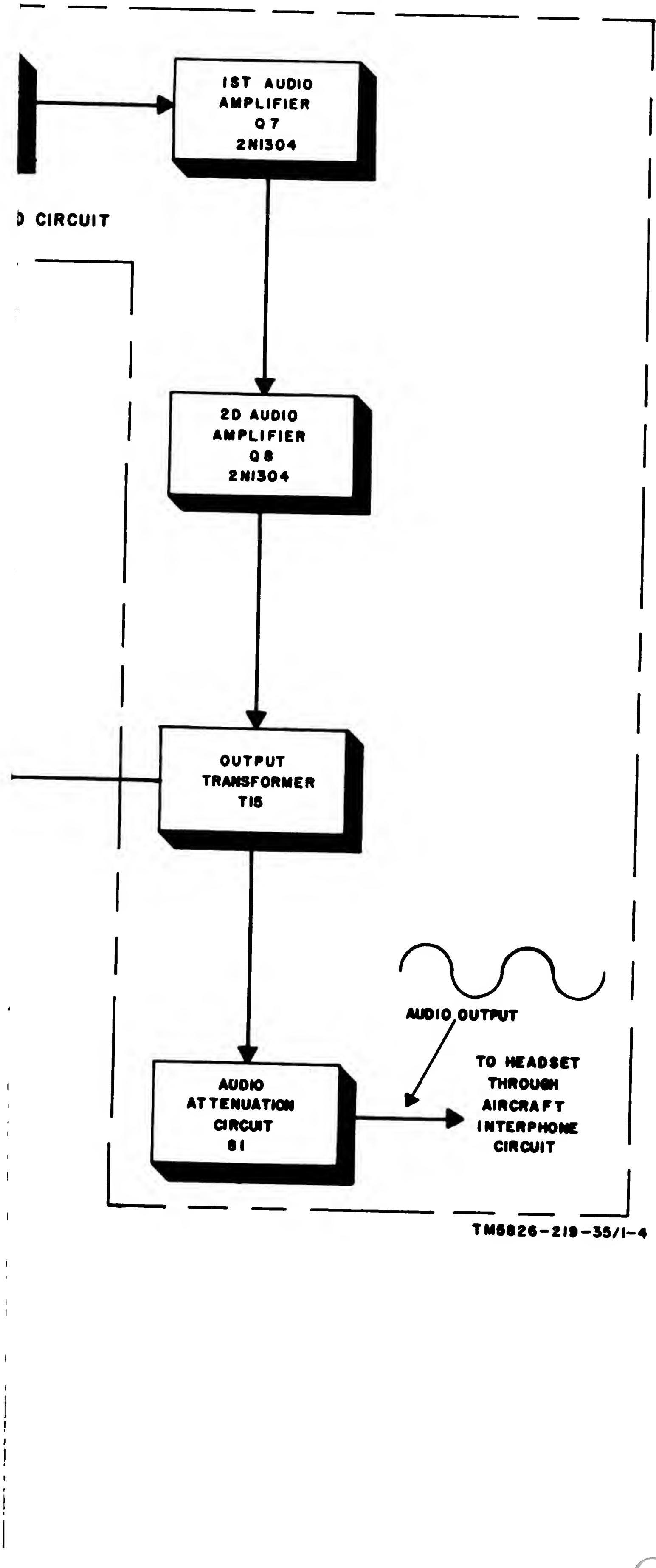

1ST AUDIO AMPLIFIER Q7 2N1304
D CIRCUIT
2D AUDIO AMPLIFIER Q8 2N1304
OUTPUT TRANSFORMER T15
AUDIO OUTPUT
AUDIO ATTENUATION CIRCUIT 81
TO HEADSET THROUGH AIRCRAFT INTERPHONE CIRCUIT
TM5826-219-35/1-4

Figure 6-6.

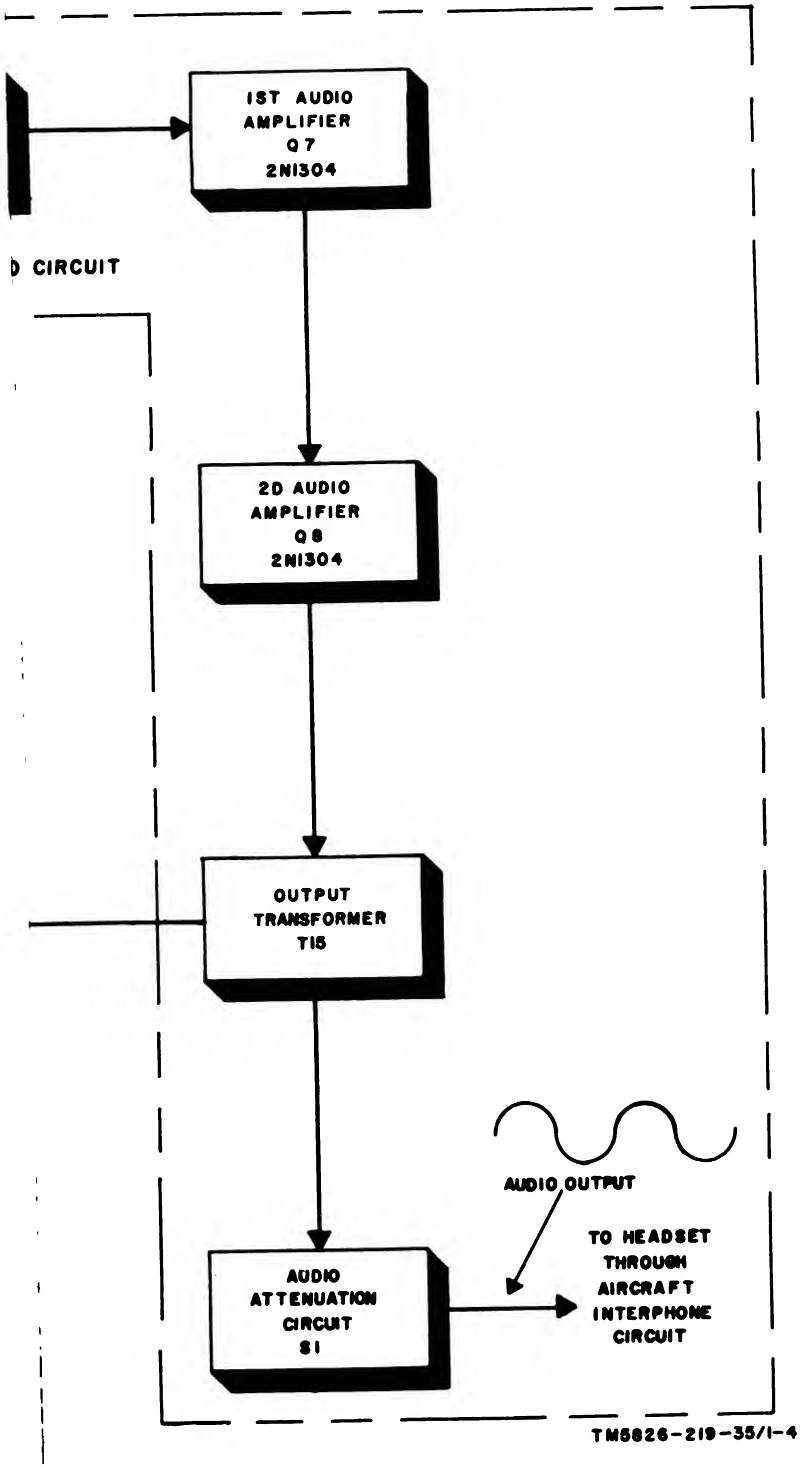

1ST AUDIO
AMPLIFIER
Q7
2N1304
D CIRCUIT
2D AUDIO
AMPLIFIER
Q8
2N1304
OUTPUT
TRANSFORMER
T15
AUDIO OUTPUT
TO HEADSET
THROUGH
AIRCRAFT
INTERPHONE
CIRCUIT
AUDIO
ATTENUATION
CIRCUIT
S1
TM5826-219-35/1-4

Figure 6-6.

NOTES:

ɛE INDICATED, RESISTANCES ARE IN OHMS, 1/4 WATT, IE IN UUF.

.STER IS FOR ROOM TEMPERATURE (25 DEGREES C.).

TION OF POTENTIOMETERS R14 AND R17 INCREASE SENSITIVITY.

T BE SET TO THE 1-7 POSITION.

AT MAX. ATTENUATION IS VIEWED FROM THE REAR KNOB.

)UIPMENT MARKING

.TE TEST POINTS USED FOR VOLTAGE AND IUREMENTS.

TM5826-219-35/1-5

Figure 6-7.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official.

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-36 (Unclas) requirements for Direct and General Support Maintenance applicable to the OV-1A; OV-1B; OV-1C; TO-1D; U-1A; U-6A; U-8D; U-8F; RU-8D; CH-21B; CH-21C, CH-34A; CH-34C; CH-37B; CH-47A; UH-1A: UH-1B; UH-1D; UH-19C; and UH-19D. aircrafts.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1988 O - 201-421(80490)

PIN : 028219-000